

From: (b)(6)
To: (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, CI; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Cc: (b)(6) (Group III Mgt.); (b)(6) (PM, Group III Management); (b)(6) (Group III Mgt Superintendent); (b)(6)
Subject: [Non-DoD Source] RE: TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS
Date: Monday, July 11, 2016 10:10:38

Thanks (b)(6) for your help to make this schedule.

(b)(6) is working with our sub on our punchlist. (b)(6) told my sub this Saturday that after completion of our punchlist he would be ready to go over 2 days to develop his punchlist at the CLEO. I think we're moving in the right direction.

I have the cost proposal for the Visitor's Center drainage on my desk. Will send it to you today. Thanks. R/(b)(6)

(b)(6) | Deputy Project Manager & Small Business Liaison | |
311 Parachute Tower Road | Camp Lejeune, NC 28542 |
Phone: w/(b)(6) | c/(b)(6) | Email: (b)(6)
Dragados USA, Inc. is An Equal Opportunity Employer

-----Original Message-----

From: (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune [mailto:(b)(6)]
Sent: Monday, July 11, 2016 10:00 AM
To: (b)(6) NAVFAC MIDLANT, CI; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Cc: (b)(6) (Group III Mgt.); (b)(6) (PM, Group III Management); (b)(6) (Group III Mgt Superintendent); (b)(6)
Subject: RE: TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS

(b)(6) /All

(b)(6) will be onsite to do TAB and controls verification July 25th and 26th, and the morning of the 27th if necessary. Please have the appropriate subs on site.

(b)(6) PE
Supervisory Construction Manager
ROICC, Camp Lejeune, NC
(b)(6)

-----Original Message-----

From: (b)(6) [mailto:(b)(6)]
Sent: Thursday, July 07, 2016 2:32 PM
To: (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, CI; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Cc: (b)(6) (Group III Mgt.); (b)(6) (PM, Group III Management); (b)(6) (Group III Mgt Superintendent); (b)(6)
Subject: [Non-DoD Source] TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS

Good afternoon (b) / (b)(6). Attached are the revised TAB test reports for the CLEO building. It was reviewed and signed by my QC Manager. All changes identified by (b) have been made. Peter's last comments are included at the end of the attachment. Request (b)(6) review and comment as soon as he is able. I am sending this digitally-only for now. Please advise if you feel hard copy should follow. I recommend sending hard copy for the files once this gets approved. Thanks. R/ (b)

(b)(6) | Deputy Project Manager & Small Business Liaison | |

311 Parachute Tower Road | Camp Lejeune, NC 28542 |

Phone: w (b)(6) c (b)(6) Email: (b)(6)

Dragados USA, Inc. is An Equal Opportunity Employer

From: (b)(6) .NAVFAC MIDLANT, ROICC Camp Lejeune
To: (b)(6) .NAVFAC MIDLANT, BD (b)(6) .NAVFAC MIDLANT, Staff (b)(6)
(b) .NAVFAC MIDLANT, ROICC Camp Lejeune (b)(6) .NAVFAC MIDLANT, ROICC Camp Lejeune
Subject: Correspondence Regarding Group III (Email 4), Freedom of Information Act (FOIA) Request DON-NAVY-2017-003161 - Camp Lejeune - P1383 & P1384 Base Entry Point / CLEO Building Projects Contract No. K1310-002-S / Project Number K1310 SLO Case No. 16-970
Date: Friday, May 12, 2017 13:23:51
Attachments: [Non-DoD Source RE P-1383 CLEO TAB Verification and PVT field checks preparations.msg](#)
[Non-DoD Source RE TRANSMITTAL 1238 REV 1 CLEO TAB TEST REPORTS.msg](#)
[P-1383 CLEO TAB Verification and PVT field checks preparations.msg](#)
[Non-DoD Source RE TRANSMITTAL 1238 REV 1 CLEO TAB TEST REPORTS.msg](#)
[RE TRANSMITTAL 1238 REV 1 CLEO TAB TEST REPORTS.msg](#)
[Non-DoD Source TRANSMITTAL 1238 REV 1 CLEO TAB TEST REPORTS.msg](#)

FYI

(b)(6)
Contract Specialist
ROICC Camp Lejeune
(b)(6)
DSN (b)
(b)(6) fax
(b)(6)

From: (b)(6)
To: (b)(6) NAVFAC MIDLANT, CI: (b)(6)
Cc: (b)(6) (Group III Mgt.); (b)(6) (PM, Group III Management); (b)(6) (b) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) (Group III Mgt Superintendent) (b)(6) (b)(6) (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Subject: [Non-DoD Source] RE: P-1383 CLEO TAB Verification and PVT field checks preparations
Date: Friday, July 22, 2016 16:39:04
Attachments: [Pre PVT Trends and Pre FPT \(3\).pdf](#)

(b) :

Attached is a file with Pre-PVT Checklist, Trends, and Pre-FPT.

The FPT with the signs on will be submitted on Monday in the morning as well as the most recent Pre-FPT and/or any other as requested.

Sorry we couldn't arrange in this last 2 days to get a copy of the documents. Anyway, all the HVAC equipment are working and the system ready for PVT.

Thank You

(b)(6) / Quality Control Manager || 311 Parachute Tower Road, Camp Lejeune, NC 28542

Cell Phone (b)(6) | Phone: (b)(6) | Fax: | Email: (b)(6)

Dragados USA, Inc. is An Equal Opportunity Employer

-----Original Message-----

From: (b)(6) NAVFAC MIDLANT, CI [[\(b\)\(6\)](mailto:(b)(6))]
Sent: Wednesday, July 20, 2016 4:34 PM
To: (b)(6)
Cc: (b)(6) (Group III Mgt.); (b)(6) (PM, Group III Management); (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) (Group III Mgt Superintendent); (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Subject: P-1383 CLEO TAB Verification and PVT field checks preparations

(b)(6)

In preparation for the TAB verification and PVT next week, please provide a copy of the completed Pre-FPT and FPT checklists as completed by the commissioning agent, and the completed Pre-PVT checklist and control system trend log graphs by the controls subcontractor by Friday, 22 July. The creation of the graphic trend logs may be the only item that has not been completed at this point.

To clarify my request:

- 1) Pre-FPT checklists, filled out with signatures, are necessary to perform the FPT/TAB.
- 2) FPT checklists, filled out with signatures, are necessary to confirm system readiness for PVT.
- 3) Pre-PVT checklist, filled out, is necessary to confirm DDC system readiness for PVT.
- 4) Control Loop Trend Logs (as graphs) are necessary to confirm system stability prior to PVT:
 - a) graphical plots required under 23 09 23.13 22 section 3.5.10 can be combined with those of section 3.5.4.q.
 - b) graphical plots should contain trends of each variable point (zone temperatures, damper positions, etc.)
 - c) variable point trends should be overlaid on setpoint trends (e.g.: zone temp and cooling setpoint on same graph)
 - d) for ease of printing, when necessary, graphs should be on a white or light color background
 - e) graphical plots should illustrate system responses to changes in set points and/or parameters
 - f) based on (a) and (e), the length of trended data can vary, but appropriately scaled 24/48 hour spans are

acceptable

g) DDC system screenshots are acceptable provided they show both the variable point and the set point together

All four items can be submitted electronically via email.

Please contact me before Friday should there be any questions on the above.

Respectfully,

(b)(6)

(b)(6), EIT, PMP

Mechanical Acceptance Engineer

(b)(6) / DSN (b)(6) / CELL (b)(6) / FAX: (b)(6)

(b)(6)

-----Original Message-----

From (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune

Sent: Monday, July 11, 2016 10:00 AM

To (b)(6) NAVFAC MIDLANT, CI; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, RIOCC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune

Cc: (b)(6) Group III Mgt.; (b)(6) (PM, Group III

Management); (b)(6) (Group III Mgt Superintendent); (b)(6)

Subject: RE: TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS

(b)(6) /All

(b)(6) will be onsite to do TAB and controls verification July 25th and 26th, and the morning of the 27th if necessary. Please have the appropriate subs on site.

(b)(6), PE

Supervisory Construction Manager

ROICC, Camp Lejeune, NC

(b)(6)

-----Original Message-----

From (b)(6) [mailto:(b)(6)]

Sent: Thursday, July 07, 2016 2:32 PM

To (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, CI; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, RIOCC Camp Lejeune

Cc: (b)(6) (Group III Mgt.); (b)(6) (PM, Group III

Management); (b)(6) (Group III Mgt Superintendent); (b)(6)

Subject: [Non-DoD Source] TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS

Good afternoon (b)(6) / (b)(6). Attached are the revised TAB test reports for the CLEO building. It was reviewed and signed by my QC Manager. All changes identified by (b)(6) have been made. (b)(6) last comments are included at the end of the attachment. Request (b)(6) review and comment as soon as he is able. I am sending this digitally-only for now. Please advise if you feel hard copy should follow. I recommend sending hard copy for the files once this gets approved. Thanks. R/ (b)(6)

(b)(6) | Deputy Project Manager & Small Business Liaison | |

311 Parachute Tower Road | Camp Lejeune, NC 28542 |

Phone: w (b)(6) | c (b)(6) | Email: (b)(6)

Dragados USA, Inc. is An Equal Opportunity Employer



GROUP III MGT., INC.

PO Box 1393 (28503)

2820 West Vernon Ave., Kinston, NC (28504)

Phone (252) 527-3333

Fax (252) 527-3377

July 22, 2016

To: (b)(6)

From:

Re: Pre-PVT Checklist, Trends, & Pre-FPT Checklist

- 1) Pre-PVT- Item #U Please see the note that a laptop will be turned over to the Owner at the end of the project.
- 2) Trends- The Trends for Geothermal Water Temperatures HP-1, HP-3, and HP-4 are included. Group III had HP-2 turned off insulating the condensate lines.
- 3) Pre-FPT- Please note that as of the Pre-FPT's that the HPWH pump was not operating as designed. The pump is now operating and there is Hot Water to the Building.

Cc:

(b)(6)

P1383 New Base Entry Point
Section 23 09 23.13 20

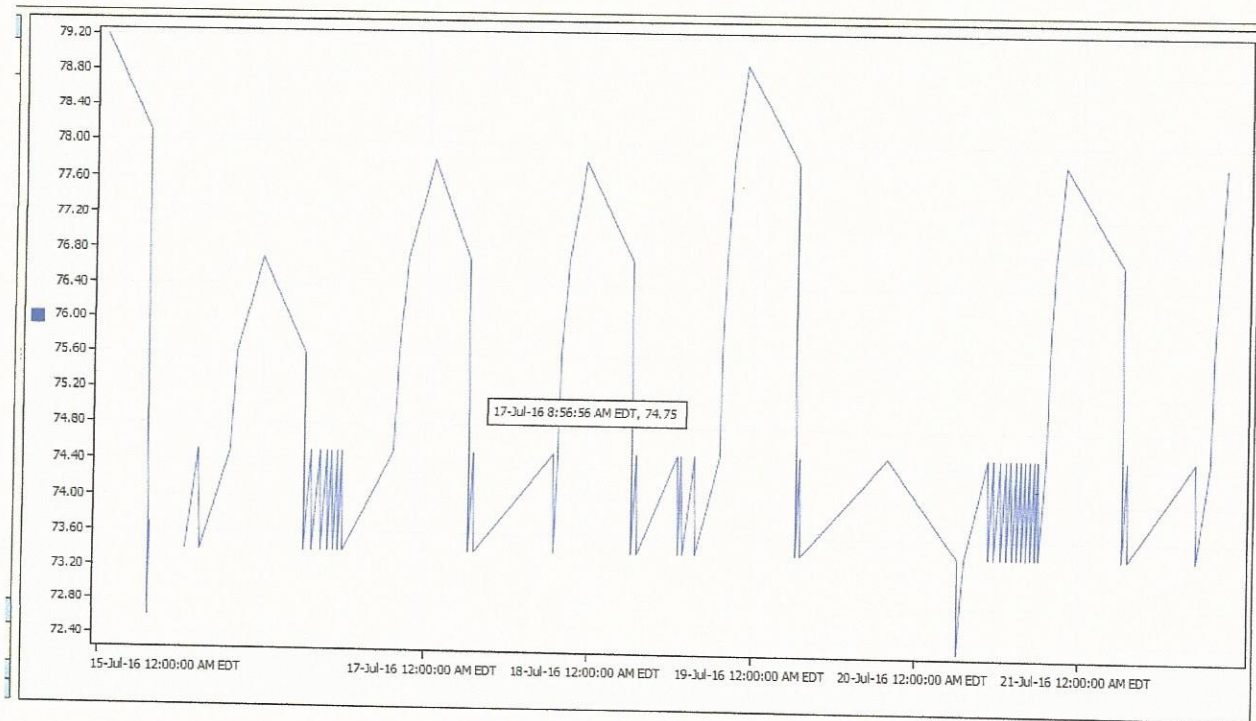
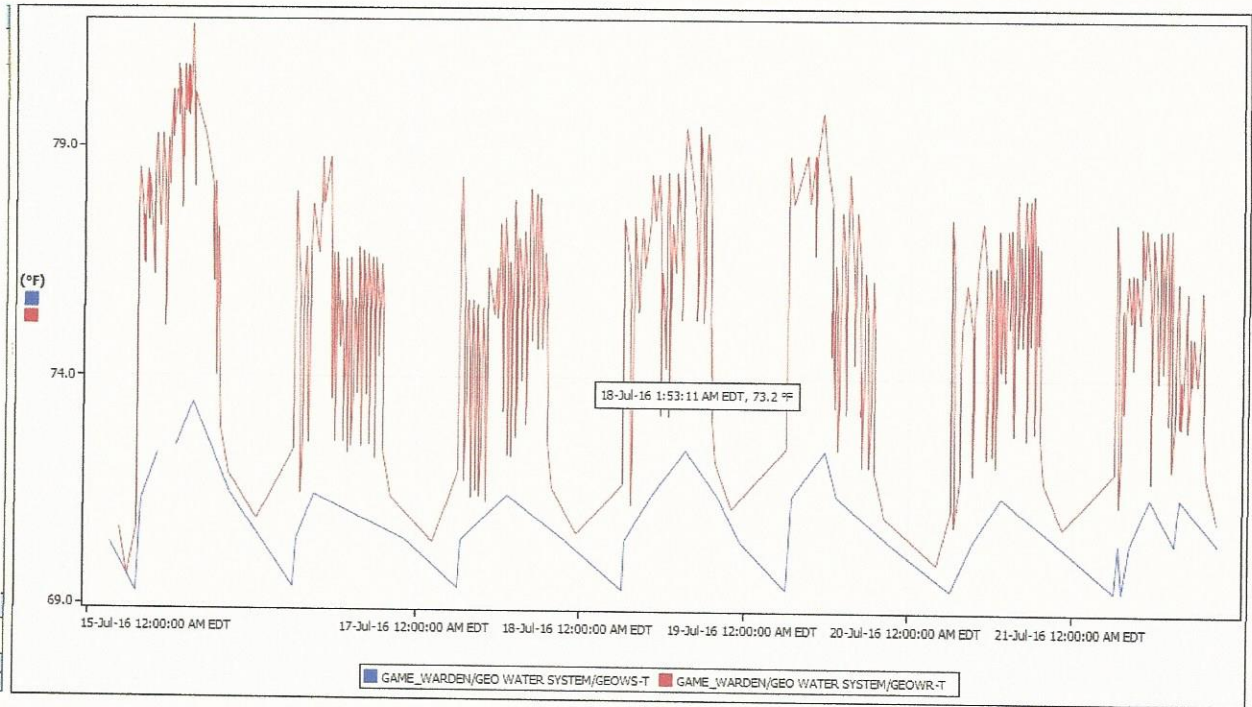
- n. Verify all valve and actuator zero and span adjustments are set properly.
☒ Yes ☐ No
- o. Verify all sensor readings are accurate and calibrated.
☒ Yes ☐ No
- p. Verify each control valve and actuator goes to normal position upon loss of power.
☒ Yes ☐ No
- q. Verify all control loops are tuned for smooth and stable operation. View trend data where applicable.
☒ Yes ☐ No
- r. Verify each controller works properly in stand-alone mode.
☒ Yes ☐ No
- s. Verify all safety controls and devices function properly, including freeze protection and interfaces with building fire alarm systems.
☒ Yes ☐ No
- t. Verify all electrical interlocks work properly.
☒ Yes ☐ No
- u. Verify all workstations, notebooks, and maintenance personnel interface tools are delivered, all system and database software is installed, and graphic pages are created for each workstation and notebook.
☐ Yes ☐ No *END OF CONTRACT*
- v. Verify the as-built (shop) control drawings are complete.
☒ Yes ☐ No

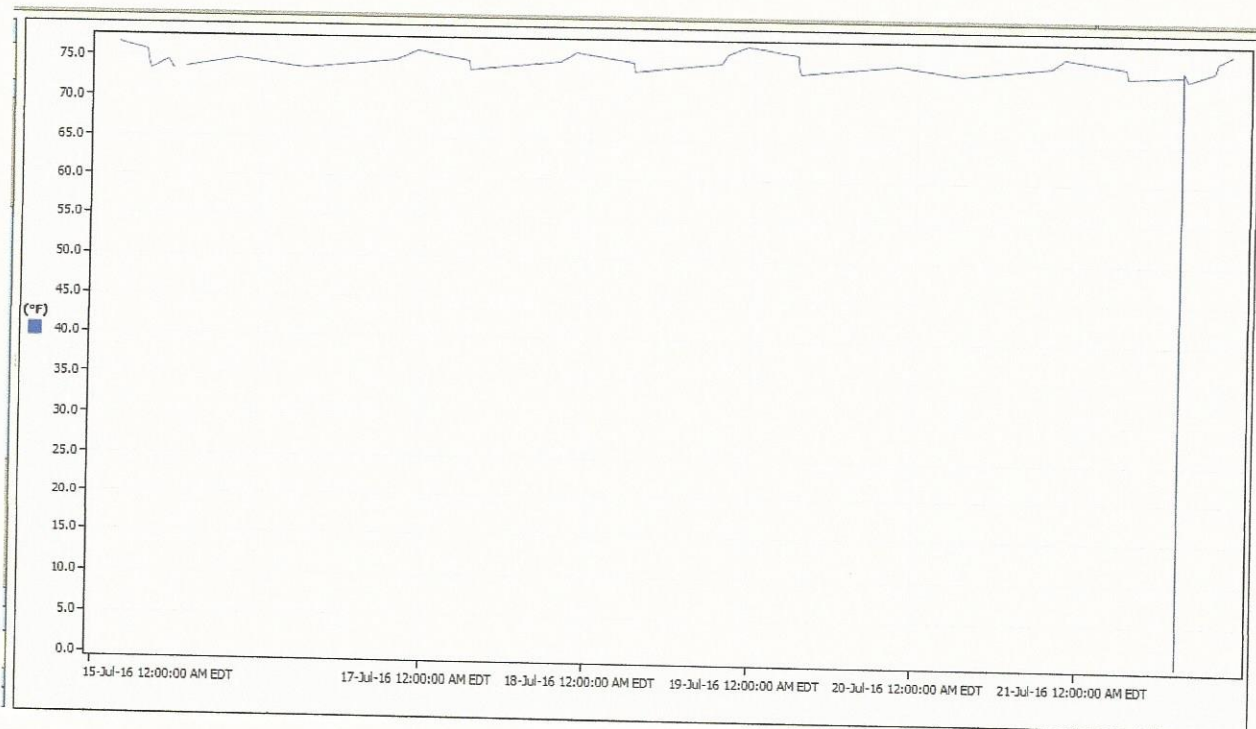
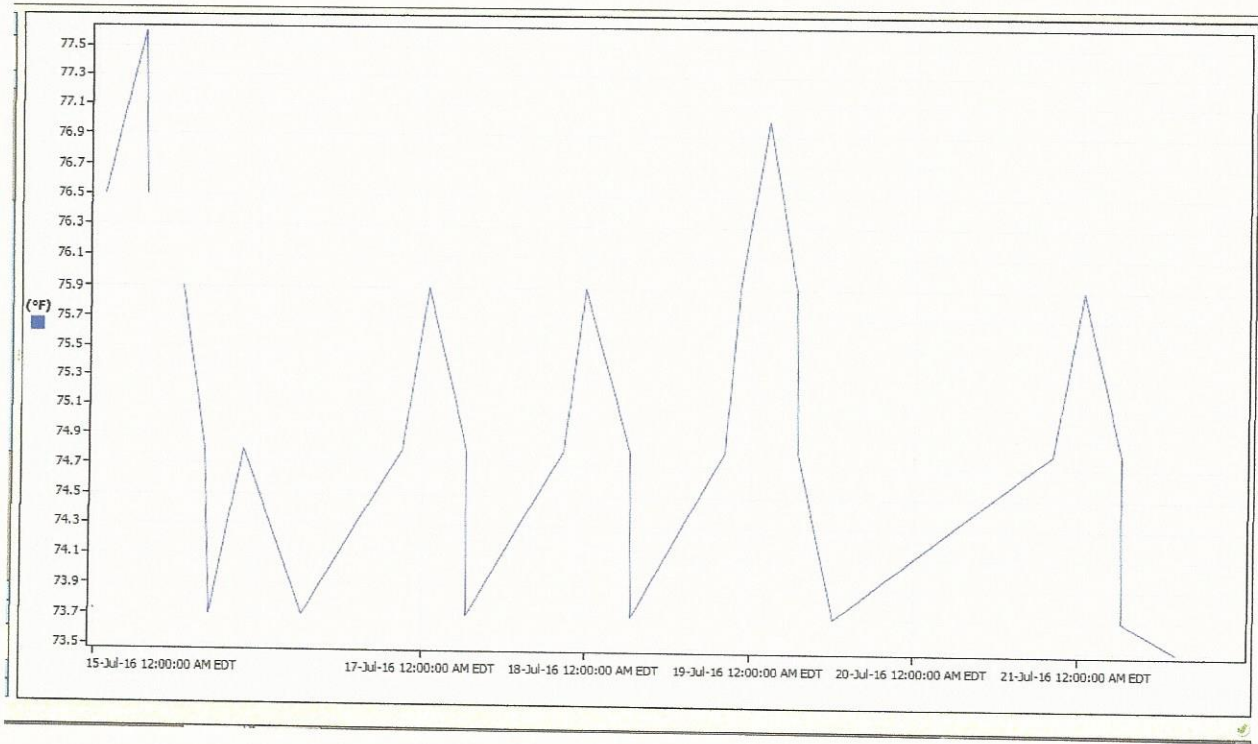
Steve M... 5-6-16

P1383 New Base Entry Point
Section 23 09 23.13 20

Pre-Performance Verification Testing Checklist

- a. Verify all required mechanical installation work is successfully completed, and all HVAC equipment is working correctly (or will be by the time PVT is conducted).
☒ Yes ☐ No
- b. Verify HVAC motors operate below full-load amperage ratings.
☒ Yes ☐ No
- c. Verify all required control system components, wiring, and accessories are installed.
☒ Yes ☐ No
- d. Verify the installed control system architecture matches approved drawings.
☒ Yes ☐ No
- e. Verify all control circuits operate at the proper voltage and are free from grounds or faults.
☒ Yes ☐ No
- f. Verify all required surge protection is installed.
☒ Yes ☐ No
- g. Verify the A/C Power Table specified in "CONTROLS SYSTEMS OPERATORS MANUALS" is accurate.
☒ Yes ☐ No
- h. Verify all DDC network communications function properly, including uploading and downloading programming changes.
☒ Yes ☐ No
- i. Using the BACnet protocol analyzer (if provided or required in this specification), verify communications are error free.
☒ Yes ☐ No
- j. Verify each digital controller's programming is backed up.
☒ Yes ☐ No
- k. Verify all wiring, components, and panels are properly labeled.
☒ Yes ☐ No
- l. Verify all required points are programmed into devices.
☒ Yes ☐ No
- m. Verify all TAB work affecting controls is complete.
☒ Yes ☐ No







Commissioning Solutions, Inc.

**3850-A Airport Road, NW
Wilson, NC 27896
(252)-291-5100**

**COMMISSIONING REPORT
CONSERVATION LAW ENFORCEMENT OFFICE (CLEO)**

**BASE ENTRY POINT
OLD SAWMILL ROAD
P-1383**

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

FEBRUARY 2016



COMMISSIONING CHECK SHEET

Centrifugal Pump

PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT Camp Lejeune – Base Entry Point
EQUIPMENT TAG P-1
SYSTEM Geothermal Loop

TEST DATE 8 MARCH 2016
LOCATION Mechanical Room
DWG. NO WM101/WM601

As Scheduled					
Make	B&G	Model Number	Series 90	Serial Number	NG
HP	2.0	Impeller Diameter – inches	1.25"	Volts/FL Amps	208/1
GPM	46	Ft Head	54	Pump RPM	3450
Service	Geothermal Loop	Speed Control	No	Efficiency	NG
Comments: Pump DDC relay start with circuit setter for flow control					

As Submitted					
Make		Model Number		Serial Number	
HP		Impeller Diameter – inches		Volts/FL Amps	
GPM		Ft Head		Pump RPM	
Service		Speed Control		Efficiency	
Comments:					

As Installed					
Make	B&G	Model Number	SERIES 90	Serial Number	
HP	1.5	IMPELLER	4.375"	Volts/Amps	208V/1Φ, 9.1A
GPM	SEE TAB REPORT	Ft Head	54.3 FT	Pump RPM	3450
Service	GEOTHERMAL LOOP	Speed Control	*	Efficiency	PRIMUM
Comments: VFD SPECIFIED, MOTOR START RELAY RECOMMENDED					

Pre Functional Checklist Item and Description	NA	Yes	No	Comments
Pump Installation				
Piping system installed		✓		
Piping system hot water filled and flushed CONDENSER WATER		✓		
Piping system hot water pump make up water set		✓		
Pump start up strainer removed or strainer cleaned		✓		
Adjustable foot support installed underneath suction diffuser	✓			
Pressure/temperature gauges/ports installed		✓		



COMMISSIONING CHECK SHEET
Centrifugal Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 MARCH 2016
EQUIPMENT TAG	P-1	LOCATION	Mechanical Room
SYSTEM	Geothermal Loop	DWG. NO	WM101/WM601

Pre Functional Checklist Item and Description	NA	Yes	No	Comments
Valves installed per detail drawing		✓		
Pressure relief valve and size installed per drawings		✓		
Pump Electrical				
Power available to pump disconnect.		✓		
Proper motor rotation verified		✓		
Power available to Variable Frequency Drive	✓			NOT FUNCTIONAL
Starter overload heaters set to FLA of motor/sized correctly		✓		VFD BYPASSED
Control system interlocks functional		✓		
Verify that disconnect is located within sight of the unit it controls		✓		
Pump Controls				
Verify proper location, installation and calibration of the water temperature sensors		✓		
Pump volume controller-VFD operable			✓	

Comments:

PUMP RUNNING IN BYPASS, CIRCUISSETER USED TO CALIBRATE DESIGN FLOW.



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	21 JUNE 2016
EQUIPMENT TAG	Admin Bldg HPWH-1	LOCATION	Mechanical Room
SYSTEM	Geothermal Water Heating	DWG. NO	WM-401/WP-501

As Scheduled					
Make	Florida Heat Pump	Model Number	WT025	Serial Number	NG
		Total Cooling Capacity	N/A	Total Heating Capacity	20,000 BTUH
Temp In	115-deg	V/Amps	208/1	Temp Out	125
Condenser Water GPM	4.0			Hot Gas Reheat (Y/ N)	N/A
Comments: Set Point Temperature = 125-deg F					

As Submitted					
Make		Model Number		Serial Number	
		Total Cooling Capacity		Total Heating Capacity	
Temp In		Volts/Amps			
Condenser Water GPM				Gas Reheat (Y/ N)	
Comments:					

Contractor					
Make		Model Number		Serial Number	
		Total Cooling Capacity		Total Heating Capacity	
Temp In		Volts/Amps			
Condenser Water GPM				Gas Reheat (Yes or No)	
Comments:					

Pre Functional Check	Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
Piping Installation											
	Piping Connections complete.					X					
	Piping leak test complete.					X					
	Valve direction verified					X		X			
	Piping insulated as required.					X					
	Verify open/closed status of control valves					X		X	X		
	Flexible connectors installed as specified.					X					



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	
EQUIPMENT TAG	Admin Bldg HPWH-1	LOCATION	Mechanical Room
SYSTEM	Geothermal Water Heating	DWG. NO	WM-401/WP-501

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
Unit Installation										
Inspection and access doors are operable and sealed					X					
Condenser water piping properly connected					X		X			
Condensate drainage is unobstructed and routed to drain					X					
					X		X			
Unit Electrical										
Power available to unit disconnect(s).						X				
Power available to unit control panel						X				
					X	X	X			
Verify that disconnect(s) is located within sight of the unit it controls						X				
Power available to electric heating coil						X				
Unit Controls										
Temperature Sensors installed/wiring complete					X		X	X		
Control valves operable					X		X			
Unit control system operable and verified					X		X	X		
Verify proper location and installation of temperature sensor					X					
Testing, Adjusting, and Balancing										
TAB Report submitted					X		X			

Comments:

COMMISSIONING CHECK SHEET
Energy Recovery Ventilator System
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 March 2016
EQUIPMENT TAG	ERV-1	LOCATION	Mechanical Room
SYSTEM	Administration Building	DWG. NO	WM-401/WM-601

As Scheduled							
Make	Greenheck	Model Number	Minivent - 750		Serial Number	NG	
		Cooling Capacity	N/A		Heating Capacity	N/A	
SF HP	0.5	SF Volts/FL Amps	120/1	SF CFM	720	SF ESP/TSP-in. wg	0.50
EF HP	0.5	EF Volts/FL Amps	120/1	EF CFM	500	EF ESP/TSP-in. wg	0.5
Comments: Supply and Exhaust Fans have fixed speed direct drives.							

As Submitted							
Make		Model Number			Serial Number		
		Cooling Capacity			Heating Capacity		
SF HP		SF Volts/FL Amps		SF CFM		SF ESP/TSP-in. wg	
EF HP		EF Volts/FL Amps		EF CFM		EF ESP /TSP-in. wg	
Comments:							

As Installed							
Make	GREENHECK	Model Number	MV-750-PSC		Serial Number	13967587	
		Cooling Capacity			Heating Capacity	N/A	
SF HP	.25	SF Volts/FL Amps		SF CFM	TBD	SF ESP/TSP-in. wg	
EF HP	.25	EF Volts/FL Amps		EF CFM	TBD	EF ESP/TSP-in. wg	
Comments SEE TAB REPORT FOR AIR FLOW DATA - SUPPLY FAN / EXHAUST FAN							

Requested documentation submitted	Rec'd	Comments
Submittals with performance data	<input checked="" type="checkbox"/>	
Equipment Start-up Sheets	<input checked="" type="checkbox"/>	
Comments:		

COMMISSIONING CHECK SHEET
Energy Recovery Ventilator System
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	<u>Camp Lejeune – Base Entry Point</u>	TEST DATE	<u>8 March 2016</u>
EQUIPMENT TAG	<u>ERV-1</u>	LOCATION	<u>Mechanical Room</u>
SYSTEM	<u>Administration Building</u>	DWG. NO	<u>WM-401/WM-601</u>

Pre Functional Checklist Item and Description	NA	Yes	No	Comment #
Ductwork Installation-Pre Commissioning Checks				
Ductwork complete.		✓		
Ductwork leak test complete.		✓		
Fire dampers, smoke dampers, and access doors installed as required.	✓			NOT REQUIRED
Ductwork insulated as required.		✓		
Thermometers and gauges installed as required.		✓		
Verify open/closed status of dampers.		✓		
Verify smoke dampers operation.	✓			NOT REQUIRED
Flexible connectors installed as specified.		✓		
ERV Installation				
Installation and access doors are operable and sealed		✓		
Condensate drainage is unobstructed. (Visually verify drainage by pouring a cup of water into drain pan).		✓		
Fan belt adjusted. <u>Supply Fan</u>	✓			DIRECT DRIVE
Fan belt adjusted. <u>Exhaust Fan</u>	✓			
Construction filters removed and correct filters installed			✓	
Start-up and checkout complete		✓		
ERV Electrical				
Power available to unit disconnect(s).		✓		
Power available to unit control panel		✓		
Proper motor rotation verified on the <u>Supply Fan</u>				
Proper motor rotation verified on the <u>Exhaust Fan</u>				
Verify that disconnect(s) is located within sight of the unit it controls		✓		
ERV Controls				
Outside Air Damper/actuator properly installed		✓		
Return Air Damper/actuator properly installed		✓		
Relief/Exhaust Air Damper/actuator properly installed		✓		
Outside Air Damper/actuator operable		✓		
Return Air Damper/actuator operable		✓		
Relief/Exhaust Air Damper/actuator operable	✓	✓		DIRECT DRIVE
<u>Supply Fan</u> air volume controller-VFD operable	✓			
<u>Exhaust Fan</u> air volume controller-VFD operable	✓			
Air handling unit control system operational.		✓		

COMMISSIONING CHECK SHEET
Energy Recovery Ventilator System
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	<u>Camp Lejeune – Base Entry Point</u>	TEST DATE	<u></u>
EQUIPMENT TAG	<u>ERV-1</u>	LOCATION	<u>Mechanical Room</u>
SYSTEM	<u>Administration Building</u>	DWG. NO	<u>WM-401/WM-601</u>

Comments:

Pre-functional checklist items are to be completed as part of stat-up & initial checkout, preparatory to performing functional performance test procedures, prior to performance of TAB.

- This checklist does not take the place of the manufacturer's recommended checkout and startup procedures or report.



COMMISSIONING CHECK SHEET
Exhaust Fan
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT
EQUIPMENT TAG
SYSTEM

Camp Lejeune – Base Entry Point
Admin Bldg EF-1
Toilet Room Ventilation

TEST DATE 8 MARCH 2016
LOCATION Women's
DWG. NO WM101/WM601

As Scheduled					
Make	Panasonic	Model Number	FV-08VKS2	Serial Number	NG
Fan HP	16.2W		Ceiling	Volts/Amps	120/1
CFM	50		Direct Drive		
Comments: Speed Control Required					

As Submitted					
Make		Model Number		Serial Number	
Fan HP				Volts/Amps	
CFM					
Comments:					

As Installed					
Make	PANASONIC	Model Number	FV-05-11VKS1	Serial Number	NIA
Fan HP	12W		CEILING	Volts/Amps	120/1, 1A
CFM	SEV TAB REPORT		DIRECT DRIVE		
Comments: SPEED CONTROL INSTALLED - OCCUPANCY SENSOR					

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Comment #
Exhaust Fan Installation									
Unit installed with wall/ceiling brackets and at the proper height per Manufacturer's recommendations		✓				X	X	X	
Exhaust Fan Electrical									
Power available to unit disconnect.		✓					X		
Proper motor rotation verified		✓					X	X	
Verify that the power disconnect is located within sight of the unit it controls		✓					X		
Exhaust Fan Controls									
Verify proper location and installation of the thermostat (NO)	✓					X			
Verify Intake louver opens with fan start	✓					X			



COMMISSIONING CHECK SHEET
Exhaust Fan
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	<u>Camp Lejeune – Base Entry Point</u>	TEST DATE	<u>8 March 2016</u>
EQUIPMENT TAG	<u>Admin Bldg EF-1</u>	LOCATION	<u>Women's</u>
SYSTEM	<u>Toilet Room Ventilation</u>	DWG. NO	<u>WM101/WM601</u>

Comments:

COMMON EXHAUST BACK TO ERV UNIT - FAN OPERATIONAL



COMMISSIONING CHECK SHEET
Exhaust Fan
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT Camp Lejeune – Base Entry Point
EQUIPMENT TAG Admin Bldg EF-2
SYSTEM Toilet Room Ventilation

TEST DATE 8 March 2010
LOCATION Men's
DWG. NO WM101/WM601

As Scheduled					
Make	Panasonic	Model Number	FV-08VKS2	Serial Number	NG
Fan HP	16.2W		Ceiling	Volts/Amps	120/1
CFM	50		Direct Drive		
Comments: Speed Control Required					

As Submitted					
Make		Model Number		Serial Number	
Fan HP				Volts/Amps	
CFM					
Comments:					

As Installed					
Make	PANASONIC	Model Number	FV-05-11VKS1	Serial Number	N/A
Fan HP	12W		CEILING	Volts/Amps	120/1, .1A
CFM	SEE TAB REPORT		DIRECT DRIVE		
Comments: SPEED CONTROL INSTALLED - OCCUPANCY SENSOR					

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Comment #
Exhaust Fan Installation									
Unit installed with wall/ceiling brackets and at the proper height per Manufacturer's recommendations		✓				X	X	X	
Exhaust Fan Electrical									
Power available to unit disconnect.		✓					X		
Proper motor rotation verified		✓					X	X	
Verify that the power disconnect is located within sight of the unit it controls		✓					X		
Exhaust Fan Controls									
Verify proper location and installation of the thermostat (no)	✓					X			
Verify Intake louver opens with fan start	✓					X			



COMMISSIONING CHECK SHEET
Exhaust Fan
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 MARCH 2016
EQUIPMENT TAG	Admin Bldg EF-2	LOCATION	Men's
SYSTEM	Toilet Room Ventilation	DWG. NO	WM101/WM601

Comments:

COMMON EXHAUST BACK TO ERU UNIT - FAN OPERATIONAL



COMMISSIONING CHECK SHEET
Exhaust Fan
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 March 2016
EQUIPMENT TAG	Admin Bldg EF-3	LOCATION	Vehicle Storage
SYSTEM	Room Ventilation	DWG. NO	WM101/WM601

As Scheduled					
Make	Greenheck	Model Number	SE1-12-432	Serial Number	NG
Fan HP	1/20		Sidewall	Volts/Amps	120/1
CFM	300		Direct Drive		
Comments: Speed Control Required					

As Submitted					
Make		Model Number		Serial Number	
Fan HP				Volts/Amps	
CFM					
Comments:					

As Installed					
Make	GREENHECK	Model Number	SE1-12-432	Serial Number	N/A
Fan HP	1/8		SIDEWALL	Volts/Amps	120/1, 1.6A
CFM	SEE TAB REPORT		DIRECT DRIVE		
Comments: FAN CONTROLLED VIA CO SENSOR					

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Comment #
Exhaust Fan Installation									
Unit installed with wall/ceiling brackets and at the proper height per Manufacturer's recommendations		✓				X	X	X	
Exhaust Fan Electrical									
Power available to unit disconnect.		✓					X		
Proper motor rotation verified		✓					X	X	
Verify that the power disconnect is located within sight of the unit it controls		✓					X		
Exhaust Fan Controls									
Verify proper location and installation of the thermostat (N2)	✓					X			
Verify Intake louver opens with fan start		✓				X			



COMMISSIONING CHECK SHEET
Exhaust Fan
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 MARCH 2016
EQUIPMENT TAG	Admin Bldg EF-3	LOCATION	Vehicle Storage
SYSTEM	Room Ventilation	DWG. NO	WM101/WM601

Comments:

- FAN RUNS BASED ON CO TESTSWITCH -
- RECOMMEND FAN ON/OFF SWITCH INSTALLED TO PROVIDE VENTILATION



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	11 July 2016
EQUIPMENT TAG	Admin/Classroom WSHP-1	LOCATION	Room # 131
SYSTEM	Heating and Cooling	DWG. NO	WM-102/WM-401

As Scheduled							
Make	Florida Heat Pump		Model Number	AP409		Serial Number	NG
	Total Cooling Capacity		37,000 BTUH		Total Heating Capacity		33,700 BTUH
SF HP	..75	Volts/Amps	208/1	SF CFM	1450	SF ESP (in. wg)	0.5
Condenser Water GPM			12	Hot Gas Reheat (Yes or No)			No
Comments: Outside Air = 150 cfm							

As Submitted							
Make			Model Number			Serial Number	
	Total Cooling Capacity				Total Heating Capacity		
SF HP		Volts/Amps		SF CFM		SF ESP (in. wg)	
Condenser Water GPM				Hot Gas Reheat (Yes or No)			
Comments:							

As Installed (To be completed by installing contractor)							
Make	CLIMATE MASTER		Model Number	TTV049		Serial Number	S14828806
	Total Cooling Capacity		37.0 MBH		Total Heating Capacity		
SF HP	1.0	SF Volts/Amps	208/1	SF CFM	1450	SF ESP (in. wg)	0.40
Condenser Water GPM			SEE TAB REPORT		Hot Gas Reheat (Yes or No)		
Comments: AUTO FLOW CONTROL (SET FOR 12 GPM) (ROOM SENSOR IN CLASSROOM)							

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
Ductwork Installation										
Ductwork complete.		✓			X					
Ductwork leak test complete.		✓			X					
Fire dampers, smoke dampers, and access doors installed as required.	✓				X		X			
Ductwork insulated as required.		✓			X					
Verify open/closed status of dampers.		✓			X		X	X		
Verify smoke dampers operation.	✓				X		X			
Flexible connectors installed as specified.		✓			X					



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT Camp Lejeune - Base Entry Point
EQUIPMENT TAG Admin/Classroom WSHP-1
SYSTEM Heating and Cooling

TEST DATE 11 July 2016
LOCATION Room # 131
DWG. NO WM-102/WM-401

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
AHU Installation										
Inspection and access doors are operable and sealed		✓			X					
Condensate water piping properly connected		✓			X		X			
Condensate drainage is unobstructed and routed to drain		✓			X					
Fan belt adjusted. Supply Fan (if applicable) (Direct Drive)	✓				X		X			
Construction filters removed and correct filters installed			✓		X		X			
Compressor properly connected		✓				X				
AHU Electrical										
Power available to unit disconnect(s).		✓				X				
Power available to unit control panel		✓				X				
Proper motor rotation verified on the Supply Fan		✓			X	X	X			
Verify that disconnect(s) is located within sight of the unit it controls		✓				X				
Power available to electric heating coil	✓					X				
AHU Coils/Compressor										
Condenser water piping properly connected		✓			X					
AHU Controls										
Discharge Air Temperature Sensor installed/wiring complete		✓			X		X	X		
Zone Temperature Sensor installed/wiring complete		✓			X		X	X		
Auxiliary Float Switch installed/wiring complete	✓				X					
Control valves operable		✓			X		X			
Unit control system operable and verified		✓			X		X	X		
Verify proper location and installation of the thermostat		✓			X					
Testing, Adjusting, and Balancing										
TAB Report submitted (SECOND SUBMITTAL)		✓			X		X			

Comments:



COMMISSIONING CHECK SHEET **Water Source Heat Pump** PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	11 July 2016
EQUIPMENT TAG	Admin/Classroom WSHP-2	LOCATION	Room # 109
SYSTEM	Heating and Cooling	DWG. NO	WM-102/WM-401

As Scheduled					
Make	Florida Heat Pump	Model Number	AP035	Serial Number	NG
	Total Cooling Capacity		40,100 BTUH	Total Heating Capacity	37,800 BTUH
SF HP	..50	Volts/Amps	208/1	SF CFM	1020
				SF ESP (in. wg)	0.5
Condenser Water GPM	9			Hot Gas Reheat (Yes or No)	No
Comments: Outside Air = 355 cfm					

As Submitted					
Make		Model Number		Serial Number	
	Total Cooling Capacity			Total Heating Capacity	
SF HP		Volts/Amps		SF CFM	
				SF ESP (in. wg)	
Condenser Water GPM				Hot Gas Reheat (Yes or No)	
Comments:					

As Installed (To be completed by installing contractor)					
Make	CLIMATE MASTER	Model Number	TRV03B	Serial Number	514625322
	Total Cooling Capacity		40	Total Heating Capacity	
SF HP	0.5	SF Volts/Amps	208/1	SF CFM	1016
				SF ESP (in. wg)	0.69
Condenser Water GPM	SEE TAB REPORT			Hot Gas Reheat (Yes or No)	
Comments: AUTO FLOW CONTROL (SET FOR 9 gpm) (WALL SENSOR, ROOM 120A)					

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
Ductwork Installation										
Ductwork complete.		✓			X					
Ductwork leak test complete.		✓			X					
Fire dampers, smoke dampers, and access doors installed as required.	✓				X		X			
Ductwork insulated as required.		✓			X					
Verify open/closed status of dampers.		✓			X		X	X		
Verify smoke dampers operation.	✓				X		X			
Flexible connectors installed as specified.		✓			X					



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT Camp Lejeune – Base Entry Point
EQUIPMENT TAG Admin/Classroom WSHP-2
SYSTEM Heating and Cooling

TEST DATE 11 July 2014
LOCATION Room # 109
DWG. NO WM-102/WM-401

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
AHU Installation										
Inspection and access doors are operable and sealed		✓			X					
Condensate water piping properly connected		✓			X		X			
Condensate drainage is unobstructed and routed to drain		✓			X					
Fan belt adjusted. Supply Fan (if applicable) (Direct Drive)	✓				X		X			
Construction filters removed and correct filters installed			✓		X		X			
Compressor properly connected		✓				X				
AHU Electrical										
Power available to unit disconnect(s).		✓				X				
Power available to unit control panel		✓				X				
Proper motor rotation verified on the Supply Fan		✓			X	X	X			
Verify that disconnect(s) is located within sight of the unit it controls		✓				X				
Power available to electric heating coil	✓					X				
AHU Coils/Compressor										
Condenser water piping properly connected		✓			X					
AHU Controls										
Discharge Air Temperature Sensor installed/wiring complete		✓			X		X	X		
Zone Temperature Sensor installed/wiring complete		✓			X		X	X		
Auxiliary Float Switch installed/wiring complete	✓				X					
Control valves operable		✓			X		X			
Unit control system operable and verified		✓			X		X	X		
Verify proper location and installation of the thermostat		✓			X					
Testing, Adjusting, and Balancing										
TAB Report submitted		✓			X		X			

Comments:



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune - Base Entry Point	TEST DATE	11 July 2016
EQUIPMENT TAG	Admin/Classroom WSHP-3	LOCATION	Room #109
SYSTEM	Heating and Cooling	DWG. NO	WM-102/WM-401

As Scheduled					
Make	Florida Heat Pump	Model Number	AP049	Serial Number	NG
	Total Cooling Capacity		47,500 BTUH	Total Heating Capacity	62,000 BTUH
SF HP	..75	Volts/Amps	208/1	SF CFM	1700
				SF ESP (in. wg)	0.5
Condenser Water GPM	12			Hot Gas Reheat (Yes or No)	No
Comments: Outside Air = 220 cfm					

As Submitted					
Make		Model Number		Serial Number	
	Total Cooling Capacity			Total Heating Capacity	
SF HP		Volts/Amps		SF CFM	
				SF ESP (in. wg)	
Condenser Water GPM				Hot Gas Reheat (Yes or No)	
Comments:					

As Installed (To be completed by installing contractor)					
Make	CLIMATE MASTER	Model Number	TTVO49	Serial Number	514B28804
	Total Cooling Capacity		45.5MBH	Total Heating Capacity	
SF HP	1.0	SF Volts/Amps	208/1	SF CFM	1700
				SF ESP (in. wg)	0.57
Condenser Water GPM	SEE TAB REPORT			Hot Gas Reheat (Yes or No)	
Comments: AUTOFLOW CONTROL - SET AT 12 gpm (WALL SENSOR - ROOM 114A)					

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
Ductwork Installation										
Ductwork complete.		✓			X					
Ductwork leak test complete.		✓			X					
Fire dampers, smoke dampers, and access doors installed as required.	✓				X		X			
Ductwork insulated as required.		✓			X					
Verify open/closed status of dampers.		✓			X		X	X		
Verify smoke dampers operation.	✓				X		X			
Flexible connectors installed as specified.		✓			X					



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	11 July 2016
EQUIPMENT TAG	Admin/Classroom WSHP-3	LOCATION	Room # 109
SYSTEM	Heating and Cooling	DWG. NO	WM-102/WM-401

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
AHU Installation										
Inspection and access doors are operable and sealed		✓			X					
Condensate water piping properly connected		✓			X		X			
Condensate drainage is unobstructed and routed to drain		✓			X					
Fan belt adjusted. Supply Fan (if applicable) (DIRECT DRIVE)	✓				X		X			
Construction filters removed and correct filters installed			✓		X		X			
Compressor properly connected		✓				X				
AHU Electrical										
Power available to unit disconnect(s).		✓				X				
Power available to unit control panel		✓				X				
Proper motor rotation verified on the Supply Fan		✓			X	X	X			
Verify that disconnect(s) is located within sight of the unit it controls		✓				X				
Power available to electric heating coil	✓					X				
AHU Coils/Compressor										
Condenser water piping properly connected		✓			X					
AHU Controls										
Discharge Air Temperature Sensor installed/wiring complete		✓			X		X	X		
Zone Temperature Sensor installed/wiring complete		✓			X		X	X		
Auxiliary Float Switch installed/wiring complete	✓				X					
Control valves operable		✓			X		X			
Unit control system operable and verified		✓			X		X	X		
Verify proper location and installation of the thermostat		✓			X					
Testing, Adjusting, and Balancing										
TAB Report submitted		✓			X		X			

Comments:



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune - Base Entry Point	TEST DATE	11 July 2016
EQUIPMENT TAG	Admin/Classroom WSHP-4	LOCATION	Room # 109
SYSTEM	Heating and Cooling	DWG. NO	WM-102/WM-401

As Scheduled					
Make	Florida Heat Pump	Model Number	AP035	Serial Number	NG
	Total Cooling Capacity		37,000 BTUH	Total Heating Capacity	36,700 BTUH
SF HP	50	Volts/Amps	208/1	SF CFM	1200
				SF ESP (in. wg)	0.5
Condenser Water GPM	9			Hot Gas Reheat (Yes or No)	No
Comments: Outside Air = 145 cfm					

As Submitted					
Make		Model Number		Serial Number	
	Total Cooling Capacity			Total Heating Capacity	
SF HP		Volts/Amps		SF CFM	
				SF ESP (in. wg)	
Condenser Water GPM				Hot Gas Reheat (Yes or No)	
Comments:					

As Installed (To be completed by installing contractor)					
Make	CLIMATE MASTER	Model Number	TTV03B	Serial Number	514625321
	Total Cooling Capacity		33.6 MBH	Total Heating Capacity	
SF HP	0.5	SF Volts/Amps	208/1	SF CFM	1180
				SF ESP (in. wg)	0.40
Condenser Water GPM	SEE TAB REPORT			Hot Gas Reheat (Yes or No)	
Comments: AUTO FLOW CONTROL - SET FOR 9gpm (WALL SENSOR - ROOM 101-LOBBY)					

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Ct-Officer	Comment #
Ductwork Installation										
Ductwork complete.		✓			X					
Ductwork leak test complete.		✓			X					
Fire dampers, smoke dampers, and access doors installed as required.	✓				X		X			
Ductwork insulated as required.		✓			X					
Verify open/closed status of dampers.		✓			X		X	X		
Verify smoke dampers operation.	✓				X		X			
Flexible connectors installed as specified.		✓			X					



COMMISSIONING CHECK SHEET
Water Source Heat Pump
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	11 July 2010
EQUIPMENT TAG	Admin/Classroom WSHP-4	LOCATION	Room #109
SYSTEM	Heating and Cooling	DWG. NO	WM-102/WM-401

Pre Functional Checklist Item and Description	NA	Yes	No	Com-Agent	Mechanical	Electrical	TAB	Controls	Cr-Officer	Comment #
AHU Installation										
Inspection and access doors are operable and sealed		✓			X					
Condensate water piping properly connected		✓			X		X			
Condensate drainage is unobstructed and routed to drain		✓			X					
Fan belt adjusted. Supply Fan (if applicable) (<u>DIRECT DRIVE</u>)	✓				X		X			
Construction filters removed and correct filters installed		✓			X		X			
Compressor properly connected		✓				X				
AHU Electrical										
Power available to unit disconnect(s).		✓				X				
Power available to unit control panel		✓				X				
Proper motor rotation verified on the Supply Fan		✓			X	X	X			
Verify that disconnect(s) is located within sight of the unit it controls		✓				X				
Power available to electric heating coil	✓					X				
AHU Coils/Compressor										
Condenser water piping properly connected		✓			X					
AHU Controls										
Discharge Air Temperature Sensor installed/wiring complete		✓			X		X	X		
Zone Temperature Sensor installed/wiring complete		✓			X		X	X		
Auxiliary Float Switch installed/wiring complete	✓				X					
Control valves operable		✓			X		X			
Unit control system operable and verified		✓			X		X	X		
Verify proper location and installation of the thermostat		✓			X					
Testing, Adjusting, and Balancing										
TAB Report submitted		✓			X		X			

Comments:



COMMISSIONING CHECK SHEET
Ductless Split System/Air Cooled
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune - Base Entry Point	TEST DATE	8 March 2016
EQUIPMENT TAG	MDSS-1/MDCU-1	LOCATION	Admin Bldg
SYSTEM	Ductless Split System	DWG. NO	WM102/WM602

As Scheduled					
Indoor Unit Make	LG	Model #	LSN182CE	Serial #	
Outdoor Unit Make	LG	Model #	LSU182CE	Serial #	
Indoor Unit	Cooling Capacity	18,000 BTUH	Volts/Amps	N/A	
Outdoor Unit	Heating Capacity	18,000 BTUH	Volts/Amps	208/1	
Indoor Unit CFM	600	Refrigerant Type	NS		
Comments: Indoor unit receives power through field supplied wiring from outdoor unit					

As Submitted					
Indoor Unit Make		Model #		Serial #	
Outdoor Unit Make		Model #		Serial #	
Indoor Unit	Cooling Capacity		Volts/Total Amps		
Outdoor Unit			Volts/Total Amps		
Indoor Unit CFM		Refrigerant Type			
Comments:					

As Installed					
Indoor Unit Make	LG	Model #	LSN180HSV4	Serial #	
Outdoor Unit Make	LG	Model #	LSU180HSV4	Serial #	
Indoor Unit	Cooling Capacity		Volts/Amps	208/1, 0.4A	
Outdoor Unit			Volts/Amps	208/1, 15.4A	
Indoor Unit CFM	SEE TAB REPORT	Refrigerant Type	R410A		
Comments: WALL THERMOSTAT PROVIDED					

Pre Functional Checklist Item and Description	NA	Yes	No	Comments
Indoor Unit Installation				
Verify proper location and installation of sensor/thermostat		✓		
Condensate installed		✓		
Condensate operational		✓		
Correct filters installed		✓		



COMMISSIONING CHECK SHEET
Ductless Split System/Air Cooled
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 MARCH 2010
EQUIPMENT TAG	MDSS-1/MDCU-1	LOCATION	Admin Bldg
SYSTEM	Ductless Split System	DWG. NO	WM102/WM602

Pre Functional Checklist Item and Description	NA	Yes	No	Comments
Refrigerant piping properly connected		✓		
Refrigerant piping properly insulated		✓		
Indoor Unit Electrical				
Power available to unit		✓		
Power available to unit control panel		✓		
Verify that disconnect is located within sight of the unit it controls		✓		
Outdoor Unit Electrical				
Power available to unit disconnect.		✓		
Power available to unit control panel		✓		
Verify that disconnect is located within sight of the unit it controls		✓		
Outdoor Unit Installation				
Check condenser fans for proper rotation		✓		
Outdoor Unit Controls				
Unit safety/protection devices tested		✓		
Control system and interlocks installed		✓		
Control system and interlocks operational		✓		

Comments:

CIRCUIT WIRING TO OUT DOOR UNIT ONLY, INDOOR FAN POWERED VIA WIRING FROM OUTDOOR SECTION.



COMMISSIONING CHECK SHEET
Ductless Split System/Air Cooled
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 March 2016
EQUIPMENT TAG	MDSS-2/MDHP-2	LOCATION	Admin Bldg
SYSTEM	Ductless Split System	DWG. NO	WM102/WM602

As Scheduled					
Indoor Unit Make	LG	Model #	LSN182HE	Serial #	
Outdoor Unit Make	LG	Model #	LSU182HE	Serial #	
Indoor Unit	Cooling Capacity	19,500 BTUH	Volts/Amps	N/A	
Outdoor Unit	Heating Capacity	19,500 BTUH	Volts/Amps	208/1	
Indoor Unit CFM	500	Refrigerant Type	NS		
Comments: Indoor unit receives power through field supplied wiring from outdoor unit					

As Submitted					
Indoor Unit Make		Model #		Serial #	
Outdoor Unit Make		Model #		Serial #	
Indoor Unit	Cooling Capacity		Volts/Total Amps		
Outdoor Unit			Volts/Total Amps		
Indoor Unit CFM		Refrigerant Type			
Comments:					

As Installed					
Indoor Unit Make	LG	Model #	LSN180HSV4	Serial #	
Outdoor Unit Make	LG	Model #	LSU180HSV4	Serial #	
Indoor Unit	Cooling Capacity		Volts/Amps	208/1 0.4A	
Outdoor Unit			Volts/Amps	208/1 15.4A	
Indoor Unit CFM	SEE TAB REPORT	Refrigerant Type	R410A		
Comments: WALL THERMOSTAT PROVIDED					

Pre Functional Checklist Item and Description	NA	Yes	No	Comments
Indoor Unit Installation				
Verify proper location and installation of sensor/thermostat		✓		
Condensate installed		✓		
Condensate operational		✓		
Correct filters installed		✓		



COMMISSIONING CHECK SHEET
Ductless Split System/Air Cooled
PRE FUNCTIONAL PERFORMANCE TEST (PFPT)

PROJECT	Camp Lejeune – Base Entry Point	TEST DATE	8 MAR 2016
EQUIPMENT TAG	MDSS-2/MDHP-2	LOCATION	Admin Bldg
SYSTEM	Ductless Split System	DWG. NO	WM102/WM602

Pre Functional Checklist Item and Description	NA	Yes	No	Comments
Refrigerant piping properly connected		<input checked="" type="checkbox"/>		
Refrigerant piping properly insulated		<input checked="" type="checkbox"/>		
Indoor Unit Electrical				
Power available to unit		<input checked="" type="checkbox"/>		
Power available to unit control panel		<input checked="" type="checkbox"/>		
Verify that disconnect is located within sight of the unit it controls		<input checked="" type="checkbox"/>		
Outdoor Unit Electrical				
Power available to unit disconnect.		<input checked="" type="checkbox"/>		
Power available to unit control panel		<input checked="" type="checkbox"/>		
Verify that disconnect is located within sight of the unit it controls		<input checked="" type="checkbox"/>		
Outdoor Unit Installation				
Check condenser fans for proper rotation		<input checked="" type="checkbox"/>		
Outdoor Unit Controls				
Unit safety/protection devices tested		<input checked="" type="checkbox"/>		
Control system and interlocks installed		<input checked="" type="checkbox"/>		
Control system and interlocks operational		<input checked="" type="checkbox"/>		

Comments:

CIRCUIT WIRING TO OUTDOOR UNIT ONLY, INDOOR FAN POWERED VIA WIRING FROM OUTDOOR SECTION.

From: (b)(6)
To: (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Cc: (b)(6) (b)(6) Group III Mgt.; (b)(6) (PM, Group III Management); (b)(6) (Group III Mgt Superintendent); (b)(6)
Subject: [Non-DoD Source] RE: TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS
Date: Thursday, July 21, 2016 16:50:04
Attachments: [Certified Report 24887 Main Admin - TAB Report \(Typed\) 7-20-16 REVISED.pdf](#)
[Copy of TRANSMITTAL 1238 TAB - CLEO - REV 2.pdf](#)

The attached information is in support of the HVAC control systems for the CLEO buildings. The re-TAB was performed by Research Air Flo Inc. Attached is the TAB report for the HVAC system in CLEO, REV 2, based on (b)(6) last review; Page 10, Total and return Airflow data for HP-2.

Thank You

(b)(6) / Quality Control Manager |cid:image001.jpg@01CCBFF4.C2CA3920 | 311 Parachute Tower Road, Camp Lejeune, NC 28542

Cell Phone: (b)(6) | Phone: (b)(6) | Fax: | Email (b)(6)
<[\(b\)\(6\)](mailto:(b)(6))>

Dragados USA, Inc. is An Equal Opportunity Employer

From: (b)(6)
Sent: Thursday, July 07, 2016 2:32 PM
To: (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) (NAVFAC Contract Spec); (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Cc: (b)(6) (Group III Mgt.); (b)(6) (PM, Group III Management); (b)(6) (Group III Mgt Superintendent); (b)(6)
Subject: TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS

Good afternoon (b)(6) / (b)(6). Attached are the revised TAB test reports for the CLEO building. It was reviewed and signed by my QC Manager. All changes identified by (b)(6) have been made. (b)(6) last comments are included at the end of the attachment. Request (b)(6) review and comment as soon as he is able. I am sending this digitally-only for now. Please advise if you feel hard copy should follow. I recommend sending hard copy for the files once this gets approved. Thanks. R (b)(6)

(b)(6) | Deputy Project Manager & Small Business Liaison | |

311 Parachute Tower Road | Camp Lejeune, NC 28542 |

Phone: w (b)(6) d (b)(6) | Email: (b)(6)

Dragados USA, Inc. is An Equal Opportunity Employer



RESEARCH AIR FLO, INC.

5571 PEACHTREE ROAD
ATLANTA, GEORGIA 30341
770-452-8292 (Office)
770-455-6209 (Fax)

To: Group III Management
2820 West Vernon Avenue
Kinston, NC 28504

Date: July 19, 2016

Job: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

Job No: 24887

Attention: (b)(6)

WE TRANSMIT TO YOU THE FOLLOWING ITEM:

1. LETTERS
2. REPORTS
3. SURVEY

4. COMPANY SUBMITTAL
5. AGENDA/PROCEDURES
6. OTHER: _____

On subject job, prepared by Timothy J Larson / Robert Stanley

Copies	Item Number	Description	For Engineers Approval	For Your Information	Revision	Supplemental	Returning Loaned Material	
	2	Certified Test & Balance Report - Revised	X	X				

Remarks: We appreciate your business.

cc: _____

Sincerely,

RESEARCH AIR FLO, INC.

By: _____

RESEARCH AIR FLO, INC.

5571 Peachtree Road - Atlanta, Georgia 30341

Phone 770.452.8292 - Fax 770.455.6209

www.researchairflo.com



Certified Test, Adjust and Balance Report

Date: June 9, 2016

Project TB#: 24887

Project: New Base Entry - Main Admin and Pavilion

Address: Camp Lejeune, NC

Architect: N/A

Engineer: CEMS Engineering, Inc.

Ladson, SC

HVAC Contractor: Group III Management

Kinston, NC



RESEARCH AIR FLO, INC.

Report Certification

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Specified tolerances:

Air Handling Units - 5% / + 5% Air Distribution - 5% / + 5%

Pumps - 5% / + 5% Water Distribution - 5% / + 5%

THE DATA PRESENTED IN THIS REPORT IS A RECORD OF SYSTEM MEASUREMENTS AND FINAL ADJUSTMENTS THAT HAVE BEEN OBTAINED IN ACCORDANCE WITH THE CURRENT EDITION OF THE NEBB PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS.

ANY VARIANCES FROM DESIGN QUANTITIES, WHICH EXCEED NEBB TOLERANCES, ARE NOTED IN THE TEST- ADJUST- BALANCE REPORT PROJECT SUMMARY.

Submitted and Certified by: (b)(6)
NEBB CERTIFIED PROFESSIONAL

Report Certification Date: July 6, 2016

Research Air Flo, Inc.

Certification Number: 3209

Expiration Date: 3/31/2018

(b)(6)

Signature above



RESEARCH AIR FLO, INC.

Instrumentation Calibration

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion **TB#:** 24887

[illegible]

N/C/R = No Calibration Required



RESEARCH AIR FLO, INC.

Nomenclature

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Airflow Data		
CFM	=	Cubic Feet Per Minute
FPM	=	Feet Per Minute
SA	=	Supply Air
RA	=	Return Air
OA	=	Outside Air
EA	=	Exhaust Air

Waterflow Data		
GPM	=	Gallons Per Minute
CHW	=	Chilled Water
HW	=	Hot Water
CW	=	Condenser Water
PW	=	Process Water

Air Pressure Data		
TSP	=	Total Static Pressure (in.wc.)
ESP	=	External Static Pressure (in.wc.)
SP	=	Static Pressure (in.wc.)
ΔP or DP	=	Differential Pressure
OTA	=	Open To Atmosphere

Water Pressure Data		
FT	=	Feet Of Water Column
IN	=	Inches Of Water Column
IN HG	=	Inches Of Mercury
PSI	=	Pounds Per Square Inch
ΔP or DP	=	Differential Pressure

Temperature Data (°F)		
EAT DB	=	Entering Air Temp. Dry Bulb
LAT DB	=	Leaving Air Temp. Dry Bulb
EAT WB	=	Entering Air Temp. Wet Bulb
LAT WB	=	Leaving Air Temp. Wet Bulb
EWT	=	Entering Water Temperature
LWT	=	Leaving Water Temperature
ΔT or DT	=	Differential Temperature

Electrical Data		
HP	=	Horsepower
KW	=	Kilowatts
FLA	=	Full Load Amps
BHP	=	Brake Horsepower
VFD	=	Variable Frequency Drive
ECM	=	Electronically Commutated Motor
VSM	=	Variable Speed Motor
VSC	=	Variable Speed Controller
MSM	=	Multiple Speed Motor

Distribution Data		
CD	=	Ceiling Diffuser
SD	=	Slot Diffuser
SG	=	Supply Grille
LFD	=	Laminar Flow Diffuser
FG	=	Floor Grille
RG	=	Return Grille
EG	=	Exhaust Grille
ES	=	Exhaust Slot

Miscellaneous		
LT	=	Light Troffer
CSD	=	Continuous Slot Diffuser
°F	=	Degrees Fahrenheit
DD	=	Direct Drive
HEPA	=	High Efficiency Particulate Air
BAS	=	Building Automation System
LSD	=	Linear Supply Diffuser
RVA	=	Rotating Vane Anemometer



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 5/25/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
ERV-1-SF	GreenHeck	MV-750-PSC-QD-115	13967587	Mechanical	HPs 2,3,4

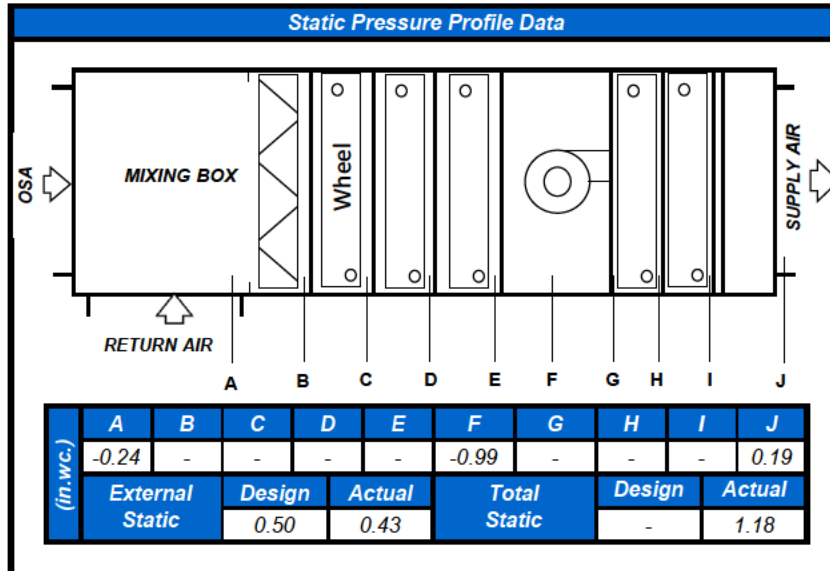
Airflow Data			
	Design	Actual	
CFM	Outlet Total	720	726
	Unit Total	720	726
	Return	-	-
	OSA	720	726

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	7.8	5.6
Average Volts	115	122
Motor RPM	1350	DD
Fan RPM	-	DD
Motor Manuf.	NL	
Motor HP	0.3	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	HP-2 OSA	HP-3 OSA	HP-4 OSA
Width	8.0	8.0	8.0
Height	8.0	8.0	8.0
Ø Dia.	-	-	-
Area (ft ²)	0.56	0.44	0.44
Actual FPM	631	512	336
Design FPM	634	500	330
S.P. (in.wc.)	.05	-.13	0.0

Cooling BTU		Design	Actual
	Total	27637	25025
	Sensible	6920	6586

Apparatus Coil Data									Flow Control Device Data				
Summer	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	-		
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	90.0	79.0	81.1	70.0	-	-	-	-	-	-	-	-
	Actual	88.7	78.0	80.3	69.8	-	-	-	-	-	-	-	-
Winter	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	-		
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	23.0	19.3	49.6	41.1	-	-	-	-	-	-	-	-
	Actual	-	-	-	-	-	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
ERV-1-EF	GreenHeck	MV-750-PSC-QD-115	13967587	Mechanical 109	Exhaust Bathrooms

Airflow Data			
	Design	Actual	
CFM	Outlet Total	500	505
	Unit Total	500	505
	Return	-	-
	OSA	-	-

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	7.8	6.2
Average Volts	115	122
Motor RPM	1350	DD
Fan RPM	-	DD
Motor Manuf.	NL	
Motor HP	0.3	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data		
Fan Sheave	Direct Drive	
Fan Bore	Direct Drive	
Motor Sheave	Direct Drive	
Motor Bore	Direct Drive	
Belt Size	Direct Drive	
Belt Quantity	Direct Drive	
Center Distance	Direct Drive	
Turns Open**	Direct Drive	
Motor Mount Adjustment	Inches In	-
	Inches Out	-

** Applies to variable pitch sheaves

Static Pressure Profile Data										
(in.wc.)	A	B	C	D	E	F	G	H	I	J
	-0.30	-	-	-	-	-1.21	-	-	-	0.50
External Static	Design		Actual		Total Static		Design		Actual	
	0.50		0.80				-		1.71	

Traverse Data (Inside Dimensions)			
Service	Exh. In	Exh. In	-
Width	-	-	-
Height	-	-	-
Ø Dia.	6.0	10.0	-
Area (ft ²)	0.20	0.55	-
Actual FPM	265	822	-
Design FPM	250	818	-
S.P. (in.wc.)	-0.02	-0.27	-

Cooling BTU		Design	Actual
	Total	45382	42109
	Sensible	6912	6436

Apparatus Coil Data									Flow Control Device Data			
Summer	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	RH%	Manufacturer	-	
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position
	Design	75.0	50.0	87.8	76.9	-	-	-	50.0	-	-	-
	Actual	71.8	48.9	83.6	74.6	-	-	-		-	-	-
Winter	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	RH%	Manufacturer	-	
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position
	Design	68.0	35.0	29.6	25.2	-	-	-	-	-	-	-
	Actual	-	-	-	-	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-1	ClimateMaster	TTV049	S14828806	Mechanical 131	Classroom 129

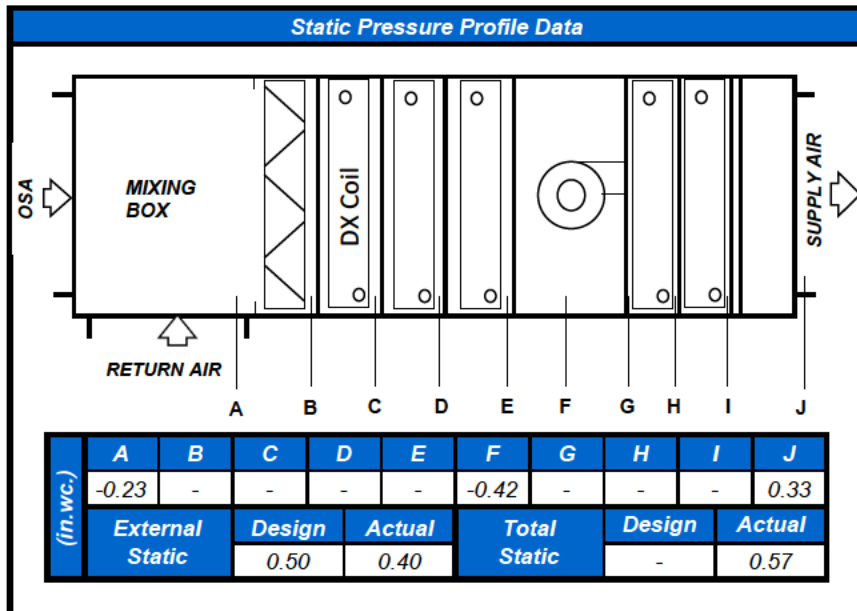
Airflow Data			
	Design	Actual	
CFM	Outlet Total	1450	1500
	Unit Total	1450	1515
	Return	1300	1371
	OSA	150	145

Motor / Fan Data		
	Design	Actual
Average Amps	6.9	2.6
Average Volts	240	212
Motor RPM	NL	Med-High
Fan RPM	-	Med-High
Motor Manuf.	U.S. Motor	
Motor HP	1.0	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-



Traverse Data (Inside Dimensions)			
Service	Sup 1-6	Return	OSA
Width	-	-	-
Height	-	-	-
Ø Dia.	16.0	16.0	8.0
Area (ft ²)	1.40	1.40	0.35
Actual FPM	1011	979	415
Design FPM	1036	929	429
S.P. (in. wc.)	.29	-.21	.05

Cooling BTU		Design	Actual
	Total	37000	39132
	Sensible	27000	26670

Apparatus Coil Data										Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	78.0	65.0	60.8	56.8	-	-	-	12.0	Auto Flow	-	-	2-32
	Actual	65.8	57.9	49.5	48.2	70.2	76.3	15.7	12.0	Auto Flow	1.50	-	7.0

Remarks:

- 1) Speed section 3 with CFM Adjust on +5%
- 2) Unit total is sup 1-6 traverse with grille 7-8 added.



Test Date: 6/8/2016 **Tested By:** (b)(6)



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-2	ClimateMaster	TTV038	S14625322	Mechanical 109	Conference 120

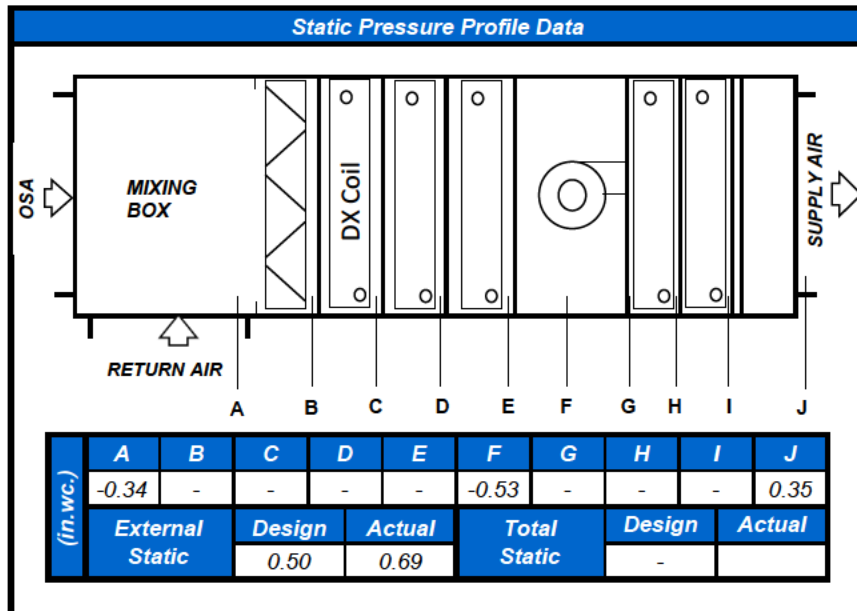
Airflow Data			
	Design	Actual	
CFM	Outlet Total	1020	1016
	Unit Total	1020	1061
	Return	665	708
	OSA	355	353

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	3.9	2.2
Average Volts	240	209
Motor RPM	NL	High
Fan RPM	-	High
Motor Manuf.	U.S. Motor	
Motor HP	0.5	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply	Return	OSA
Width	-	-	8.0
Height	-	-	10.0
Ø Dia.	14.0	14.0	-
Area (ft ²)	1.07	1.07	0.56
Actual FPM	992	662	631
Design FPM	953	621	634
S.P. (in. wc.)	.35	.34	-.05

Cooling BTU		Design	Actual
	Total	40100	37862
	Sensible	21400	23147

Apparatus Coil Data										Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	77.0	60.8	57.6	46.2	-	-	-	9.0	-	-	-	2-32
	Actual	70.4	56.4	50.2	42.0	70.3	77.9	7.2	9.0	Auto Flow	1.50	-	6.3

Remarks:

- 1) Speed section 4 with CFM adjust on -5%



RESEARCH AIR FLO, INC.

Air Distribution Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016 Tested By: (b)(6)

Unit No.	HP-2	Service	Supply	Dwg No.	WM102	Design CFM	1020	Actual CFM	1016		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
121	1	CD	8"Ø	*	*	130	*	116	*	124	
121	2	CD	8"Ø	*	*	130	*	110	*	132	
120	3	CD	8"Ø	*	*	155	*	134	*	160	
120	4	CD	8"Ø	*	*	150	*	129	*	155	
103	5	CD	6"Ø	*	*	45	*	110	*	47	
104	6	CD	8"Ø	*	*	170	*	133	*	163	
105	7	CD	6"Ø	*	*	120	*	139	*	115	
107	8	CD	6"Ø	*	*	120	*	111	*	120	

Unit No.	HP-2	Service	Return	Dwg No.	WM102	Design CFM	665	Actual CFM	685		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
121	1	RG	8"Ø	*	*	215	*	137	*	219	
120	2	RG	8"Ø	*	*	250	*	264	*	262	
125	3	RG	8x6	*	*	200	*	260	*	204	

Remarks: * Flow Hood Measurements



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-3	ClimateMaster	TTV049	S14828804	Mechanical 109	Office 114

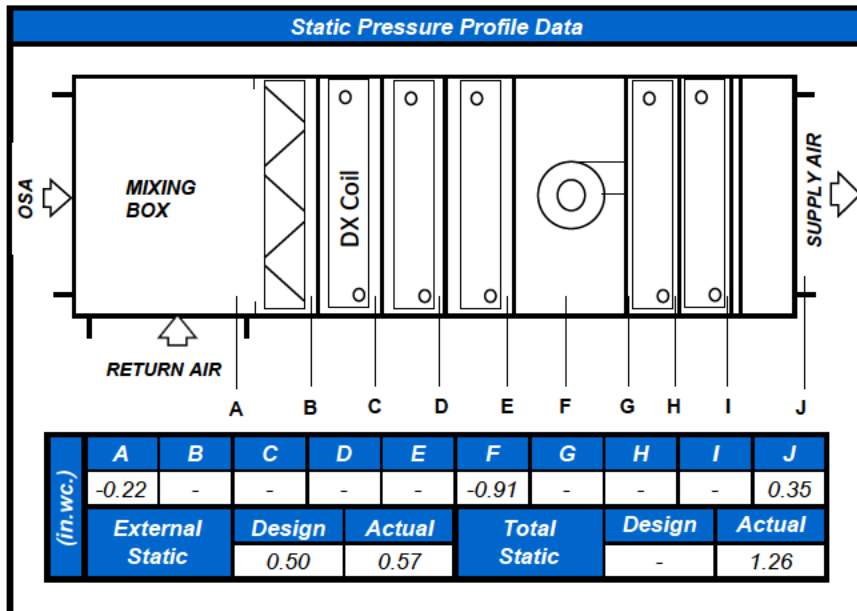
Airflow Data			
	Design	Actual	
CFM	Outlet Total	1700	1700
	Unit Total	1700	1765
	Return	1480	1540
	OSA	220	225

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	6.9	3.4
Average Volts	240	207
Motor RPM	NL	High
Fan RPM	-	High
Motor Manuf.	U.S. Motor	
Motor HP	1.0	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply	Return	OSA
Width	-	-	8.0
Height	-	-	8.0
Ø Dia.	18.0	18.0	-
Area (ft ²)	1.77	1.77	0.44
Actual FPM	997	870	512
Design FPM	960	836	500
S.P. (in. wc.)	.35	-.16	-.13

Cooling BTU		Design	Actual
	Total	47500	45511
	Sensible	39200	37552

Apparatus Coil Data										Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	77.0	59.7	55.6	49.5	-	-	-	12.0	-	-	-	2-32
	Actual	69.5	52.4	49.8	41.5	70.3	77.1	11.5	12.0	Auto Flow	1.50	-	4.0

Remarks:

- 1) Speed tap setting 4, with CFM adjust at +5%



RESEARCH AIR FLO, INC.

Air Distribution Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016 Tested By: (b)(6)

Unit No.	HP-3	Service	Supply	Dwg No.	WM102	Design CFM	1700	Actual CFM	1700		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
125	1	SG	10X3	0.11	1091	120	864	95	1055	116	
119	2	SG	12X4	0.18	1028	185	906	163	1072	193	
118	3	SG	12X4	0.18	1028	185	1078	194	1050	189	
117	4	SG	12X4	0.18	1028	185	817	147	1000	180	
116	5	SG	12X4	0.18	1028	185	956	172	1028	185	
113	6	SG	12X3	0.14	893	125	807	113	900	126	
113	7	SG	12X3	0.14	893	125	786	110	879	123	
114	8	SG	12X3	0.14	1000	140	1100	154	993	139	
114	9	SG	12X3	0.14	1000	140	964	135	1014	142	
115	10	SG	12X4	0.18	1028	185	1061	191	1006	181	
125	11	SG	10X3	0.11	1136	125	1418	156	1145	126	

Unit No.	HP-3	Service	Return	Dwg No.	WM102	Design CFM	1480	Actual CFM	1484		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
119	1	RG	8X6	0.26	654	170	535	139	665	173	
118	2	RG	8X6	0.26	654	170	542	141	638	166	
117	3	RG	8X6	0.26	654	170	604	157	662	172	
116	4	RG	8X6	0.26	654	170	708	184	650	169	
115	5	RG	8X6	0.26	654	170	588	153	673	175	
114	6	RG	10X6	0.34	765	260	874	297	794	270	
125	7	RG	12X8	0.57	649	370	719	410	630	359	

Remarks: * Flow Hood Measurements



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-4	ClimateMaster	TTV038	S14625321	Mechanical 109	Waiting 101

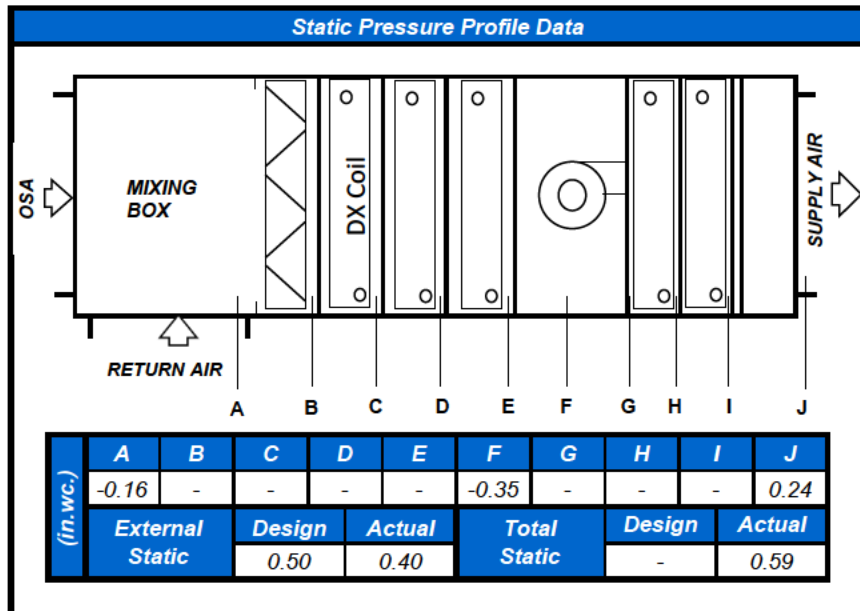
Airflow Data			
	Design	Actual	
CFM	Outlet Total	1200	1169
	Unit Total	1200	1186
	Return	1055	1037
	OSA	145	148

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	3.9	0.9
Average Volts	240	212
Motor RPM	NL	Med
Fan RPM	-	Med
Motor Manuf.	U.S. Motor	
Motor HP	0.5	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply	Return	OSA
Width	-	-	8.0
Height	-	-	8.0
Ø Dia.	16.0	16.0	-
Area (ft ²)	1.40	1.40	0.44
Actual FPM	847	741	336
Design FPM	857	754	330
S.P. (in. wc.)	.24	-.13	0

Cooling BTU		Design	Actual
	Total	37000	33623
	Sensible	26900	25618

Apparatus Coil Data										Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	76.0	58.9	55.2	47.3	-	-	-	9.0	-	-	-	2-32
	Actual	70.9	52.4	50.9	40.3	70.2	78.1	11.7	9.0	Auto Flow	1.50	-	5.2

Remarks:

- 1) Speed section 3



RESEARCH AIR FLO, INC.

Air Distribution Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016 Tested By: (b)(6)

Unit No.	HP-4		Service	Supply	Dwg No.	WM102	Design CFM	1200	Actual CFM	1169	
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
100	1	SG	10x3	0.11	909	100	685	75	889	98	
101	2	SG	14x4	0.22	1136	250	610	134	1113	245	
101	3	SG	14x4	0.22	1136	250	660	145	1084	238	
124	4	CD	6"Ø	*	*	45	*	88	*	43	
123	5	CD	6"Ø	*	*	45	*	68	*	43	
101	6	SG	10x6	0.24	500	120	455	109	481	115	
101	7	SG	10x6	0.24	500	120	540	130	490	118	
102	8	CD	6"Ø	*	*	100	*	71	*	97	
102	9	CD	6"Ø	*	*	100	*	120	*	103	
127	10	CD	6"Ø	*	*	70	*	124	*	69	

Unit No.	HP-4	Service	Return	Dwg No.	WM102	Design CFM	1055	Actual CFM	1011		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
101	1	RG	18x10	*	*	630	*	673	*	605	
127	2	RG	10"Ø	*	*	370	*	67	*	353	
127	3	RG	6"Ø	*	*	55	*	175	*	53	

Remarks: * Flow Hood Measurements



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
MDSS-1	LG	LSN180HSV4	412KAGSQW007	Wall	NMCI / Comm 111

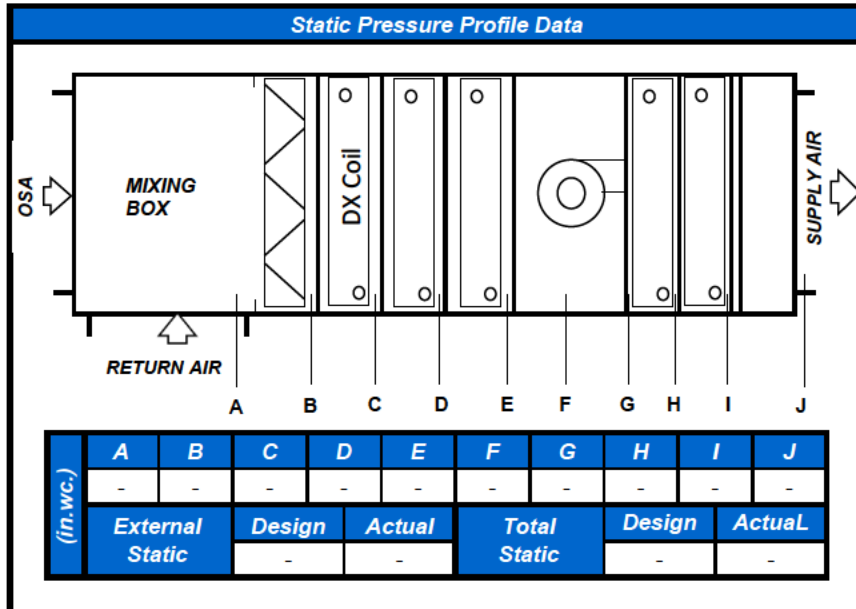
Airflow Data			
	Design	Actual	
CFM	Outlet Total	-	-
	Unit Total	600	584
	Return	600	584
	OSA	-	-

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	0.4	0.4
Average Volts	208	208
Motor RPM	ID	High
Fan RPM	-	High
Motor Manuf.	ID	
Motor HP	ID	
Phase	1	
Motor Frame	ID	
Service Factor	ID	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply		
Width	30.0		
Height	3.0		
Ø Dia.	-		
Area (ft ²)	0.63		
Actual FPM	927		
Design FPM	952		
S.P. (in.wc.)	-		

Cooling BTU		Design	Actual
	Total	18000	19053
	Sensible	-----	15642

Apparatus Coil Data									Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position
	Design	80.0	63.0	-	52.8	-	-	-	-	-	-	-
	Actual	68.3	55.4	43.5	42.1	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
MDSS-2	LG	LSN180HSV4	412KACOW003	Wall	Station 206

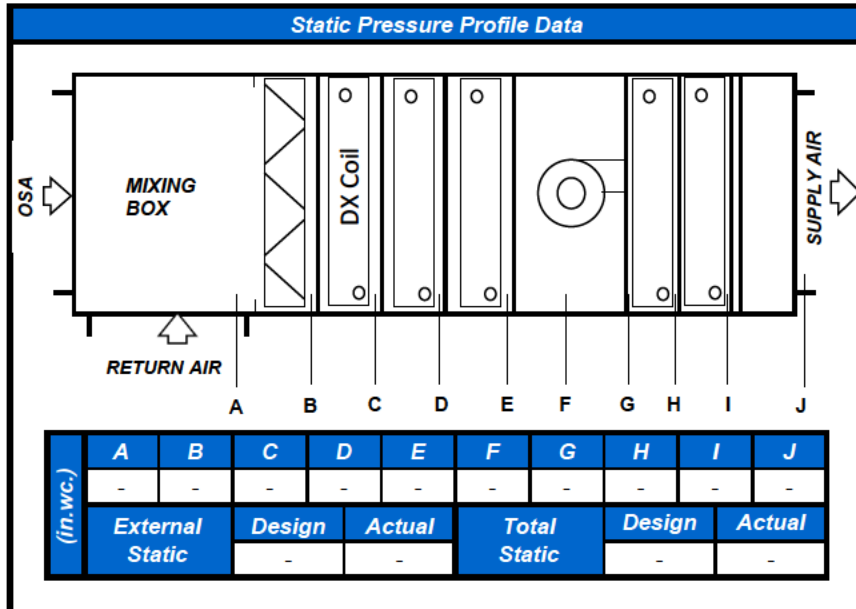
Airflow Data			
	Design	Actual	
CFM	Outlet Total	-	-
	Unit Total	500	485
	Return	500	485
	OSA	-	-

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	0.4	0.4
Average Volts	208	209
Motor RPM	ID	Med
Fan RPM	-	Med
Motor Manuf.	ID	
Motor HP	ID	
Phase	1	
Motor Frame	ID	
Service Factor	ID	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply		
Width	30.0		
Height	3.0		
Ø Dia.	-		
Area (ft ²)	0.63		
Actual FPM	771		
Design FPM	794		
S.P. (in.wc.)	-		

Cooling BTU		Design	Actual
	Total	19500	19490
	Sensible	-----	15138

Apparatus Coil Data									Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position
	Design	80.0	63.0	-	49.2	-	-	-	-	-	-	-
	Actual	70.4	56.8	41.5	40.4	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Fan Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/2016 Tested By: (b)(6)

Unit Data		Notes	
Fan Number	EF-1		
Service	Female Toilet		
Manufacturer	Panasonic		
Model Number	FV-05-11VKS1		
Airflow Data	Design	Actual	Notes
CFM (Unit Total)	50	52	
CFM (Connected Load)	-	-	
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)	0.25	-	(1)
Suction (in.wc.)	-	-	
Discharge (in.wc.)	-	-	
Motor / Fan Data	Rated	Actual	Notes
Voltage	120	119	
Amps	0.3	0.1	
Motor RPM	NL	DD	
Fan RPM	-	DD	
Motor Manufacturer	ID		
Motor HP	ID		
Phase	1		
Service Factor	ID		
VFD Setting (HZ.)	ID		
Drive Data			Notes
Fan Sheave Size	Direct Drive		
Fan Bore Size	Direct Drive		
Motor Sheave Size	Direct Drive		
Motor Bore Size	Direct Drive		
Belt Size	Direct Drive		
Number Of Belts	Direct Drive		
Center Distance	Direct Drive		

Unit Data		Notes	
Fan Number	EF-2		
Service	Male Toilet		
Manufacturer	Panasonic		
Model Number	FV-05-11VKS1		
Airflow Data	Design	Actual	Notes
CFM (Unit Total)	50	51	
CFM (Connected Load)	-	-	
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)	0.25	-	(1)
Suction (in.wc.)	-	-	
Discharge (in.wc.)	-	-	
Motor / Fan Data	Rated	Actual	Notes
Voltage	120	119	
Amps	0.3	0.1	
Motor RPM	NL	DD	
Fan RPM	-	DD	
Motor Manufacturer	ID		
Motor HP	ID		
Phase	1		
Service Factor	ID		
VFD Setting (HZ.)	ID		
Drive Data			Notes
Fan Sheave Size	Direct Drive		
Fan Bore Size	Direct Drive		
Motor Sheave Size	Direct Drive		
Motor Bore Size	Direct Drive		
Belt Size	Direct Drive		
Number Of Belts	Direct Drive		
Center Distance	Direct Drive		

Remarks:

- 1) Static too low to read.



RESEARCH AIR FLO, INC.

Fan Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/9/2016 Tested By: (b)(6)

Unit Data		Notes	
Fan Number	EF-3		
Service	Vehicle Bay		
Manufacturer	GrenHeck		
Model Number	SEI-12-432-E-X		
Airflow Data	Design	Actual	Notes
CFM (Unit Total)	300	311	
CFM (Connected Load)	-	-	
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)	0.25	-	
Suction (in.wc.)	-	-	
Discharge (in.wc.)	-	-	
Motor / Fan Data	Rated	Actual	Notes
Voltage	115	119	
Amps	1.6	1.3	
Motor RPM	1550	DD	
Fan RPM	-	DD	
Motor Manufacturer	McMillan		
Motor HP	0.13		
Phase	1		
Service Factor	NL		
VFD Setting (HZ.)	-		
Drive Data		Notes	
Fan Sheave Size	Direct Drive		
Fan Bore Size	Direct Drive		
Motor Sheave Size	Direct Drive		
Motor Bore Size	Direct Drive		
Belt Size	Direct Drive		
Number Of Belts	Direct Drive		
Center Distance	Direct Drive		

Unit Data		Notes	
Fan Number			
Service			
Manufacturer			
Model Number			
Airflow Data	Design	Actual	Notes
CFM (Unit Total)			
CFM (Connected Load)			
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)			
Suction (in.wc.)	-		
Discharge (in.wc.)	-		
Motor / Fan Data	Rated	Actual	Notes
Voltage			
Amps			
Motor RPM			
Fan RPM			
Motor Manufacturer			
Motor HP			
Phase			
Service Factor			
VFD Setting (HZ.)			
Drive Data		Notes	
Fan Sheave Size			
Fan Bore Size			
Motor Sheave Size			
Motor Bore Size			
Belt Size			
Number Of Belts			
Center Distance			

Remarks:



RESEARCH AIR FLO, INC.

Electric Heater Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/16 - 3/22/16 Tested By: (b)(6)

Unit Number		KW	Ø	Volts				Amps				CFM	Air Temp. (°F)			Notes
				L1-L2	L1-L3	L2-L3	Avg.	L1	L2	L3	Avg.		Ent.	Lvg.	ΔT	
UH-A	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.9	1	213	-	-	213	8.7	-	-	8.7	536	75.4	86.6	11.2	(1)
UH-B	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.9	1	213	-	-	213	8.8	-	-	8.8	613	79.1	88.9	9.8	(1)
UH-C	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.8	1	209	-	-	209	8.6	-	-	8.6	470	64.9	77.0	12.1	(1)
UH-D	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.8	1	208	-	-	209	8.7	-	-	8.7	409	59.2	73.1	13.9	(1)
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															

Remarks:

1) CFM Calculated from Delta T



RESEARCH AIR FLO, INC.

Pump Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 5/27/2016 & 7/1/16 Tested By: (b)(6)

Pump Data			Notes	
	Pump Number	P-1		
	Service	Geothermal		
	Pump Manuf.	Bell & Gossett		
	Model Number	90 1.25AA 4.375 BF		
	Serial Number	C196636-01 L41		
	Impeller Size (In.)	4.375		
Water Data		GPM	Notes	
	Design	46.0		
	Final	48.0		
	Wide Open	52.0		
Pressure Data		Psi.	Ft.	Notes
	Wide Open ΔP	22.8	52.7	
	No Flow Discharge	56.2	-	
	No Flow Suction	25.1	-	
	No Flow Head ΔP	31.1	71.8	
	Final Discharge	63.1	-	
	Final Suction	39.8	-	
	Final Head ΔP	23.3	53.8	
	Design Head ΔP	-	54.0	
	Pump Off (Psi)	25.1		
	ΔP Setpoint (Psi)	-		
Motor / Electrical Data		Rated	Actual	Notes
	Motor RPM	3450	DD	
	Volts	208	214	
	Amps	9.1	6.8	
	Corrected FLA	8.8		
	Motor HP	1.5		
	Phase	1		
	Motor Manuf.	Marathon		
	Service Factor	1.30		
	Calculated BHP	1.2		
	VFD Setting (HZ.)	-		

Pump Data			Notes	
	Pump Number	P-2		
	Service	HPWH-1 Load		
	Pump Manuf.	Bell & Gossett		
	Model Number	PL-36B		
	Serial Number	1BLOO3LF		
	Impeller Size (In.)	-		
Water Data		GPM	Notes	
	Design	5.0		
	Final	5.0	(1)	
	Wide Open	9.0		
Pressure Data		Psi.	Ft.	Notes
	Wide Open ΔP	13.2	30.5	
	No Flow Discharge	70.2	-	
	No Flow Suction	54.9	-	
	No Flow Head ΔP	15.3	35.3	
	Final Discharge	66.4	-	
	Final Suction	53.2	-	
	Final Head ΔP	13.2	30.5	
	Design Head ΔP	-	4.0	
	Pump Off (Psi)	30.3		
	ΔP Setpoint (Psi)	-		
Motor / Electrical Data		Rated	Actual	Notes
	Motor RPM	3300	DD	
	Volts	115	121	
	Amps	2.1	1.7	
	Corrected FLA	2.0		
	Motor HP	0.2		
	Phase	1		
	Motor Manuf.	Bell & Gossett		
	Service Factor	NL		
	Calculated BHP	0.1		
	VFD Setting (HZ.)	-		

Remarks:

- 1) Actual system pressure is over pump capacity.



RESEARCH AIR FLO, INC.

Pump Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 7/1/2016 Tested By: (b)(6)

Pump Data	Pump Number	P-3	Notes	
	Service	Recirculating	(1)	
	Pump Manuf.	Bell & Gossett		
	Model Number	NBF-22		
	Serial Number	103252LF		
	Impeller Size (In.)	-		
	Impeller Size (In.)	-		
Water Data	GPM		Notes	
	Design	NL	(1)	
	Final	0.0		
	Wide Open	0.0		
Pressure Data	Psi.		Ft.	Notes
	Wide Open ΔP	6.6	15.2	
	No Flow Discharge	57.6	-	
	No Flow Suction	51.0	-	
	No Flow Head ΔP	6.6	15.2	
	Final Discharge	57.6	-	
	Final Suction	51.0	-	
	Final Head ΔP	6.6	15.2	
	Design Head ΔP	-	NL	
	Pump Off (Psi)	59.9		
	ΔP Setpoint (Psi)	-		
Motor / Electrical Data	Rated		Actual	Notes
	Motor RPM	2940	-	
	Volts	115	119	
	Amps	0.8	0.5	
	Corrected FLA	-		
	Motor HP	0.12		
	Phase	1		
	Motor Manuf.	Bell & Gossett		
	Service Factor	NL		
	Calculated BHP	-		
	VFD Setting (HZ.)	-		

Pump Data	Pump Number		Notes	
	Service			
	Pump Manuf.			
	Model Number			
	Serial Number			
	Impeller Size (In.)			
	Impeller Size (In.)			
Water Data	GPM		Notes	
	Design			
	Final			
	Wide Open			
Pressure Data	Psi.		Ft.	Notes
	Wide Open ΔP			
	No Flow Discharge		-	
	No Flow Suction		-	
	No Flow Head ΔP			
	Final Discharge		-	
	Final Suction		-	
	Final Head ΔP			
	Design Head ΔP			
	Pump Off (Psi)			
	ΔP Setpoint (Psi)			
Motor / Electrical Data	Rated		Actual	Notes
	Motor RPM			
	Volts			
	Amps			
	Corrected FLA			
	Motor HP			
	Phase			
	Motor Manuf.			
	Service Factor			
	Calculated BHP			
	VFD Setting (HZ.)			

Remarks:

- 1) P-3 was not able to deliver design GPM at the time of testing



RESEARCH AIR FLO, INC.

Apparatus Heating Coil Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/8/2016 Tested By: Rob Stanley

Unit Data		Note	
Unit Number	HPWH-1		
Service	Load		
Air Data			
	Design	Actual	Note
CFM	-	-	
Entering DB (°F)	-	-	
Entering WB (°F)	-	-	
Leaving DB (°F)	-	-	
Leaving WB (°F)	-	-	
Water Data			
	Design	Actual	Note
GPM	5.0	5.0	
Entering Wtr.(°F)	115.0	120.0	
Leaving Wtr.(°F)	125.0	130.2	
Coil ΔP (ft.wc.)	-	13.0	
Flow Control Device Data			Note
Manufacturer	-		
Type	-		
Size (in.)	-		
Position	-		
ΔP ()	-		

Unit Data		Note	
Unit Number	HPWH-1		
Service	Geothermal		
Air Data			
	Design	Actual	Note
CFM	-	-	
Entering DB (°F)	-	-	
Entering WB (°F)	-	-	
Leaving DB (°F)	-	-	
Leaving WB (°F)	-	-	
Water Data			
	Design	Actual	Note
GPM	4.0	4.0	
Entering Wtr.(°F)	70.0	70.1	
Leaving Wtr.(°F)	-	73.2	
Coil ΔP (ft.wc.)	3.0	3.5	
Flow Control Device Data			Note
Manufacturer	TACO		
Type	ACCUFLO-VENTORI		
Size (in.)	1.00		
Position	45.0		
ΔP ()	9.6		

Remarks:



RESEARCH AIR FLO, INC.

Apparatus Heating Coil Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 12/01/16 - 2/28/17 Tested By:

Unit Data		Note	
Unit Number	HP-1	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1450	1515	
Entering DB (°F)			
Entering WB (°F)	-		
Leaving DB (°F)			
Leaving WB (°F)	-		
Water Data			
	Design	Actual	Note
GPM	12.0	12.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data			Note
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	7.0		

Unit Data		Note	
Unit Number	HP-2	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1020	1061	
Entering DB (°F)			
Entering WB (°F)	-		
Leaving DB (°F)			
Leaving WB (°F)	-		
Water Data			
	Design	Actual	Note
GPM	9.0	9.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data			Note
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	6.3		

Remarks:

- 1) Season of Maximum Load Heating



RESEARCH AIR FLO, INC.

Apparatus Heating Coil Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 12/01/16 - 2/28/17 Tested By:

Unit Data		Note	
Unit Number	HP-3	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1700	1765	
Entering DB (°F)			
Entering WB (°F)			
Leaving DB (°F)			
Leaving WB (°F)			
Water Data			
	Design	Actual	Note
GPM	12.0	12.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data		Note	
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	4.0		

Unit Data		Note	
Unit Number	HP-4	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1200	1186	
Entering DB (°F)			
Entering WB (°F)			
Leaving DB (°F)			
Leaving WB (°F)			
Water Data			
	Design	Actual	Note
GPM	9.0	9.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data		Note	
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	4.0		

Remarks:

- 1) Season of Maximum Load Heating



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

EF 1 & EF 2

WhisperGreenSelect™ VENTILATION FAN

Specification Submittal Data / Panasonic Ventilation Fan

Description

Customizable Ventilation Fan/Light shall be low voltage ceiling mount rated for continuous run. Fan shall be ENERGY STAR® rated and certified by the Home Ventilating Institute (HVI). Fan shall include energy efficient LED lighting. Evaluated by Underwriters Laboratories and conform to both UL and cUL safety standards.

Motor/Blower:

- Enclosed DC brushless motor technology rated for continuous run.
- Fan ventilation rates shall be manually adjustable for 50-80-110 CFM.
- Power rating shall be 120 volts and 60 Hz.
- Fan shall be UL listed for tub/shower enclosure when used with a GFCI protected circuit and used in insulated ceiling (TYPE I.C.).
- Fan equipped with thermal cutoff fuse.
- Removable, permanently lubricated, plug-in motor.

Housing:

- Rust proof paint, galvanized steel body.
- Integrated dual 4" or 6" diameter duct adapter.
- Built-in metal flange provides blocking for penetrations through drywall as an Air Barrier, and assists with the decrease in leakage in the Building Envelope during blower door testing.
- Built in backdraft damper.
- Articulating and expandable installation bracket up to 24".

Grille:

- Attractive design using Poly Pro material.
- Attaches directly to housing with tension springs.
- Includes a motion sensor cap for use as a cover when the motion sensor Plug 'N Play™ module has not been selected.

Light:

- Two replaceable, ENERGY STAR® rated, 7W GU24 base LED lamps



(2) 7W GU24 base LED lamps included.

Warranty:

- ALL Parts: 3 Years from original purchase date.
- DC Motor: 6 Years from original purchase date.
- LED: 5 years from original purchase date.

Architectural Specifications:

Customizable Ventilation Fan/Light shall be ceiling mount, ENERGY STAR® rated type with multi-speed control (0, 30-100 CFM, in 10 CFM increments) that shall be built-in with a high/low adjustable delay timer and activated by a wall switch, Motion Sensor Plug 'N Play™ module or Condensation Sensor Plug 'N Play™ module. Features a built-in speed selector. Select from 50/80/110 CFM and no more than <0.3/<0.3/0.4 sone as certified by the Home Ventilating Institute (HVI) at 0.1 w.g. with no less than 53/86/114 CFM and no more than <0.3/0.6/0.9 sones at .25 w.g. Power Consumption shall be no greater than 4.0/6.0/11.1 watts at 0.1 w.g. and 7.0/11.1/18.0 watts at 0.25 w.g. ENERGY STAR® rated with efficiency of no less than 12.8/13.3/9.9 CFM/watt at 0.1 w.g. and then 7.7/7.7/6.3 CFM/watt at 0.25 w.g. The motor shall be enclosed with brushless DC motor engineered to run continuously. DC motor speed shall automatically increase when the fan senses static pressure to maintain selected CFM. Power rating shall be 120v/60Hz. Duct diameter shall be no less than 4", inclusive of an integrated dual 4" or 6" duct adapter. Plug 'N Play™ modules provide up to two additional features. Select from Condensation Sensor, LED Night Light and Motion Sensor. Fan shall be UL and cUL listed for tub/shower enclosure when used with a GFCI protected circuit. Fan can be used to comply with ASHRAE 62.2, LEED, ENERGY STAR®, IAP, EarthCraft, California Title-24 and WA Ventilation Code. Lamps shall be of the LED type with the fan utilizing no less than two 7 Watt, ESTAR rated, GU24 base LED lamps.



DC Motor Technology:

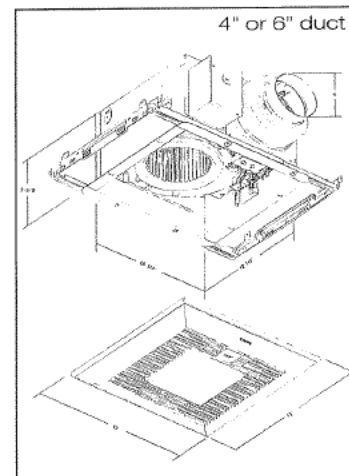
When fan senses static pressure, its speed is automatically increased to ensure that the desired CFM is not compromised, which allows the fan to perform as rated.

For complete installation Instructions visit us.panasonic.com/ventfans

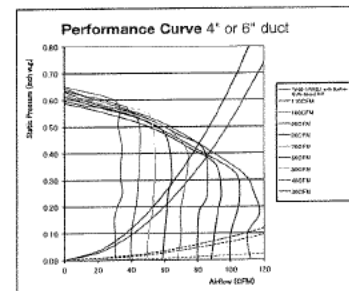


Adjustable Airflow for Maximum Performance

FV-05-11VKSL1



FV-05-11VKSL1



For complete installation Instructions visit us.panasonic.com/ventfans

Model	Quantity	Comments	Project:
			Location:
			Architect:
			Engineer:
			Contractor:
			Submitted by:
			Date:

Location

Camp Lejeune, NC

System

Exhaust



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

EF 3 Vari-Green® Motor Options



Benefits

Operates on AC power that's converted to DC—providing a more efficient motor operation as compared to an AC operation.

- The motor can attain up to 85% efficiency and reduce energy consumption.
- Watt savings of 30-70% depending on rpm.
Note: As motor speed is turned down, efficiency stays high as compared to an AC motor that decreases dramatically.
- Operates cooler than a standard AC motor at lower RPMs. A cooler motor has longer motor life and reduces energy consumption.
- 80% usable RPM turndown as low as 300 rpm.
- SEI fans with Vari-Green motors can provide all the CFM and static pressure ranges of a comparable belt drive.

- Maintenance costs are reduced as there are no belts or bearings to replace and no pulleys to adjust.
- Direct drive fans are often preferred where maintenance access is difficult.
- Provides a solution for demand controlled ventilation applications.

Vari-Green Advantages

- Initial cost is less than a belt drive/motor starter combination.
- Lower operating cost
- No maintenance, no belts, pulleys or bearings
- Easy RPM adjustment

SE1 Performance Limits - Vari-Green®

Model Number	Fan RPM	Max BHP	Max Sones	CFM/Static Pressure in Inches WG															
				0.00	0.05	0.10	0.125	0.15	0.20	0.25	0.30	0.375	0.50	0.625	0.75				
SE1-8-440	1725	0.044	11.3	511	476	435	387	349	281	220	191								
	300			89															
SE1-10-440	1725	0.098	11.3	1029	979	921	889	856	792	707									
	300			179															
SE1-12-426	1725	0.078	14.8	1239	1187	1122	1084	1043	947	828	711	468							
	300			215															
SE1-12-432	1725	0.26	14.8	1613	1553	1490	1455	1421	1334	1254	1176	1056	888	679	556				
	300			281															
SE1-12-436	1725	0.13	16.7	1621	1570	1513	1471	1429	1346	1230	1073	639							
	300			282															
SE1-14-432	1725	0.27	12.5	2370	2317	2264	2237	2209	2152	2096	2007	1864							
	300			412															
SE1-14-436	1725	0.38	16.3	2695	2635	2575	2544	2511	2445	2378	2292	2129	1728	1183					
	300			469															
SE1-14-440	1725	0.47	21	2386	2307	2234	2205	2176	2119	2048	1973	1877	1435	1262	1163				
	300			415															
SE1-16-421	1725	0.36	19	2516	2470	2424	2400	2377	2327	2268	2210	2093	1862						
	300			438															
SE1-16-426	1725	0.49	31	3136	3081	3026	2999	2972	2917	2852	2787	2681	2464						
	300			545															
SE1-16-428	1725	0.61	16.1	3325	3266	3207	3178	3149	3088	3026	2963	2849	2637	2385	1801				
	300			578															
SE1-16-436	1725	0.85	21	4019	3956	3894	3863	3832	3766	3697	3629	3526	3262	2790	2214				
	300			699															
SE1-18-424	1725	0.7	17	4164	4090	4017	3980	3943	3859	3768	3676	3519	3157	2626					
	300			724															
SE1-18-429	1725	0.85	22	4816	4737	4658	4618	4578	4489	4382	4274	4113	3817	3342	2880				
	300			838															
SE1-20-420	1550	0.61	24	4148	4074	4000	3963	3926	3859	3793	3726	3610	3352						
	1725			4616	4550	4483	4450	4417	4352	4292	4232	4143	3953	3718					
	300			803															

23

Location

Camp Lejeune, NC

System

Exhaust



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

Bell & Gossett
a xylem brand

SUBMITTAL

B-141.1

JOB: Base Entry Point

REPRESENTATIVE: James M. Pleasants Co.

UNIT TAG: P-1

ORDER NO.

DATE: 11/25/2013

ENGINEER:

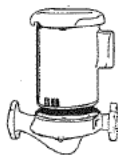
SUBMITTED BY:

DATE:

CONTRACTOR:

APPROVED BY:

DATE:



1-1/4AA Series "90" Centrifugal Pumps Vertical In-Line Mounted - Close Coupled

SPECIFICATIONS

FLOW 46 (GPM) HEAD 54 (FT)
HP 1.5 RPM 3600
VOLTS 115/208-230
CYCLE 60 PHASE 1
ENCLOSURE ODP Standard Efficient
APPROX. WEIGHT 62
SPECIALS _____

MATERIALS OF CONSTRUCTION

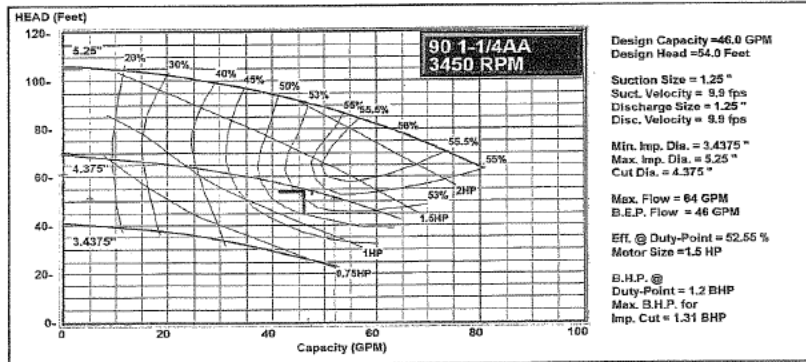
☒ BRONZE FITTED ☐ ALL BRONZE

TYPE OF SEAL

☒ 90 Standard Seal
(Buna-Carbon/Ceramic)

MAXIMUM WORKING PRESSURE

☒ 175 psi (12 bar) W.P.



xylem
Let's Solve Water

Location

Camp Lejeune, NC

System

Pumps



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

P-2

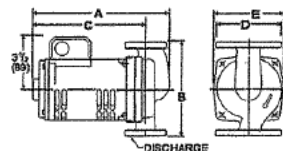
SERIES PL - Permanently Lubricated Booster Pumps

A-135G

DIMENSIONS AND WEIGHTS

MODEL NO.	FLANGE SIZE INCHES - NPT	MOTOR HP	DIMENSIONS - INCHES (mm)					APPROXIMATE SHIPPING WT. LBS. (KG)
			A	B	C	D	E	
PL-30	3/4, 1, 1-1/8 & 1-1/2	1/12	5 5/8 (219)	6 3/8 (162)	7 1/8 (181)	4 3/16 (106)	4 3/8 (111)	11.6 (5.3)
PL-40	3/4, 1, 1-1/8 & 1-1/2	1/8	6 5/8 (219)	6 3/8 (162)	7 1/8 (181)	4 3/16 (106)	4 3/8 (111)	13.1 (6.0)
PL-45	1, 1-1/4 & 1-1/2	1/8	9 1/8 (232)	8 1/2 (216)	7 1/4 (184)	4 5/8 (117)	4 1/2 (114)	14.5 (6.6)
PL-50	1, 1-1/4 & 1-1/2	1/8	9 1/8 (232)	8 1/2 (216)	7 1/4 (184)	4 5/8 (117)	4 1/2 (114)	14.5 (6.6)
PL-55	3/4, 1, 1-1/4 & 1-1/2	2/5	9 9/16 (243)	6 3/8 (162)	7 15/16 (202)	4 3/16 (106)	4 3/4 (121)	13.1 (6.0)
PL-75	2	1/8	9 15/16 (252)	8 1/2 (216)	7 3/8 (187)	5 3/16 (132)	4 5/8 (117)	16.6 (8.4)
PL-130/2"	2	2/5	10 3/4 (273)	8 1/2 (216)	8 1/4 (210)	5 3/16 (132)	5 1/8 (130)	22 (10)
PL-130/3"	3	2/5	10 3/4 (273)	8 1/2 (216)	8 1/4 (210)	6 (162)	5 1/8 (130)	27 (12.2)

Dimensions are approximate and subject to change. Contact factory for certified dimensions.

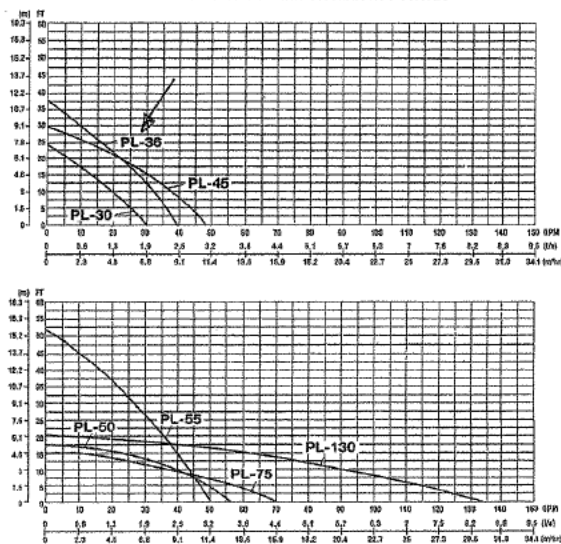


TYPICAL SPECIFICATIONS

The contractor shall furnish and install inline pumps as illustrated on the plans and in accordance with the following specifications:

1. The pumps shall be of the horizontal, permanently lubricated type, specifically designed and guaranteed for quiet operation.
2. The pumps shall have a steel shaft supported by permanently lubricated, sealed precision ball bearings. The pumps are to be equipped with a water-tight seal to prevent leakage. Mechanical seal faces to be carbon on silicon carbide. The motor shall be non-overloading at any point on the pump performance curve.
3. The motor shall be of the drip-proof, sealed precision ball-bearing, quiet-operating construction. The permanent split-capacitor motor shall be equipped with thermal overload protection.
4. Pumps to be suitable for 225°F (107°C) operating temperature at 150 psig (10 bar) working pressure. The pumps shall be Bell & Gossett, A Xylem brand. Model No. PL-_____ with a capacity of _____ GPM at _____ feet of head.

PERFORMANCE CHARACTERISTICS CURVES



Xylem Inc.
6200 N. Austin Avenue
Morton Grove, IL 60053
Phone: (847)966-3700
Fax: (847)966-8370
www.bellgossett.com

Bell & Gossett is a trademark of Xylem Inc. or one of its subsidiaries.
© 2014 Xylem Inc.

xylem
Let's Solve Water

Location

Camp Lejeune, NC

System

Pumps



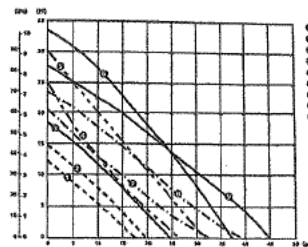
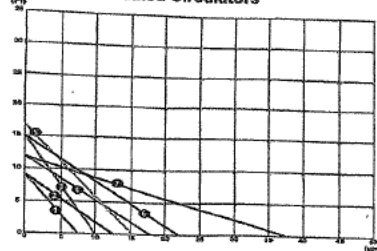
RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

System Lubricated Circulators

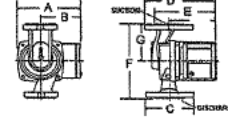
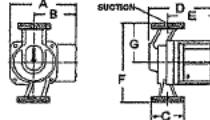
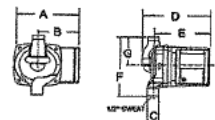
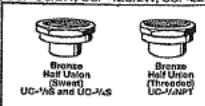


A-127L

HALF UNION CONNECTIONS

For NBF-9ULW, NBF-12ULW, NBF-22U, SSF-9ULW, SSF-12ULW, SSF-22U

MODEL NUMBER	PART NUMBER	DESCRIPTION (SETS OF 2)
UC-1/2S	113203LF	1/2" Bronze Union Sweat
UC-3/4S	113201LF	3/4" Bronze Union Sweat
UC-3/4NPT	113202LF	3/4" Bronze Union NPT Female



MODEL	PART NUMBER	A (in (mm))	B (in (mm))	C (in (mm))	D (in (mm))	E (in (mm))	F (in (mm))	G (in (mm))
NBF-9ULW	103257LF	4-7/8 (124)	3-3/16 (81)	1/2 (13)	5-7/32 (132)	4-9/32 (109)	5 (127)	2-1/2 (63)
NBF-9ULW	103258LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	5-1/8 (128)	3-1/16 (76)
SSF-9ULW	103300LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	5-1/8 (128)	3-1/16 (76)
NBF-12ULW	103259LF	4-7/8 (124)	3-3/16 (81)	1/2 (13)	5-7/32 (132)	4-9/32 (109)	5 (127)	2-1/2 (63)
NBF-12ULW	103261LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	5-1/8 (128)	3-1/16 (76)
SSF-12ULW	103361LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	5-1/8 (128)	3-1/16 (76)
NBF-12FLW	103260LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	5-9/16 (141)	3-11/16 (93)	5-3/8 (162)	3-3/16 (82)
SSF-12FLW	103360LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	5-9/16 (141)	3-11/16 (93)	5-3/8 (162)	3-3/16 (82)
NBF-18S	103316LF	4-7/8 (124)	3-3/16 (81)	1/2 (13)	5-7/32 (132)	4-9/32 (109)	5 (127)	2-1/2 (63)
NBF-22U	103255LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	5-1/8 (128)	3-1/16 (76)
SSF-22U	103362LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	5-1/8 (128)	3-1/16 (76)
NBF-22	103262LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	5-9/16 (141)	3-11/16 (93)	5-3/8 (162)	3-3/16 (82)
SSF-22	103362LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	5-9/16 (141)	3-11/16 (93)	5-3/8 (162)	3-3/16 (82)
NBF-25*	103418LF	5-1/8 (139)	3-3/16 (81)	3-3/16 (81)	4-7/8 (124)	5-3/8 (162)	2-1/2 (63)	
NBF-33	103351LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	6-3/16 (167)	3-11/16 (94)	6-3/8 (162)	3-3/16 (82)
NBF-36*	103401LF	5-3/4 (146)	3-9/16 (91)	3-3/16 (81)	6-3/16 (167)	5-3/8 (137)	6-3/8 (162)	3-3/16 (82)
NBF-45*	103405LF	6-3/4 (166)	3-9/16 (91)	3-7/16 (87)	7-3/8 (187)	6-1/2 (160)	8-1/2 (216)	4-1/4 (106)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

Companion Flanges Available In Sizes: 3/4", 1", 1-1/4", and 1-1/2"

* 3-speed circulators

Xylem Inc.
8200 N. Austin Avenue
Morton Grove, IL 60053
Phone: (847) 968-3700
Fax: (847) 968-8379
www.bellpassent.com

Bell & Gossett is a trademark of Xylem Inc. or one of its subsidiaries.
© 2014 Xylem Inc.

xylem
Let's Solve Water

Location

Camp Lejeune, NC

System

Pumps



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

3 SPECIFY THE COIL RUNOUT PIPE SIZES.

Refer to the ASHRAE recommendations shown in the chart below. Some designers prefer to use 80 percent of the ASHRAE maximum.

ASHRAE Recommended Maximum GPM

Nominal Size	Type L Copper	Std. 40 Pipe	ASHRAE Criteria
1/2"	2.8	3.8	Maximum Velocity four feet/sec.
3/4"	5.9	6.5	
1"	10	11	
1 1/4"	16	18	
1 1/2"	23	25	Maximum Loss four feet/100 feet
2"	39	41	
2 1/2"	78	72	
3"	130	160	
4"	270	275	
6"	775	775	

4 SELECT THE AUTOFLOW VALVE SPRING RANGE.

Two spring ranges are available for all AutoFlow valves: 2 to 32 psi and 5 to 60 psi. The first number is the differential pressure (ΔP) needed to achieve design flow. The second is the maximum ΔP where the design flow will be maintained. Following are some general rules on the selection of the spring range. In most cases the amount added to the calculated pump head is 4.6 feet (2 psi X 2.3 feet/psi).

- For direct return systems, if the total pump head is less than 110 feet, the 2-32 range can generally be used for all units.
- On reverse return systems the 2-32 range can be used for all units.
- For direct return systems with a total pump head exceeding 110 feet, the 5-60 range should be used only on units close to the pump to maintain control.

To calculate the spring range required for a specific terminal unit:

Estimate the losses due to -

- pump accessories such as suction diffusers, check valves, etc.
- distribution pipe loss to the terminal unit
- terminal coil, ATC, and Y-strainer drops at design flow.

Add a, b, and c and then subtract from the total pump head.

If less than 74 feet, use the 2-32 range. If greater than 74 and less than 138 feet, use the 5-60 range.

Example:

The total pump head is 132 feet and the total of a, b and c is 35 feet, $132 - 35 = 97$ Use the 5-60 range since the remaining pump head is greater than 74 feet (32 psi).

5 SELECT THE AUTOFLOW CARTRIDGE FLOW RATE.

Using the chart below, find the available flow according to the size valve required and the system design flow. If the required flow falls between two available flows, round to the nearest flow listed.

Size	PSID	Available Flow Rate (GPM) by Cartridge
1/2"-3/4"	2 - 32	0.33, 0.5, 0.67, 0.75, 0.88, 1.0, 1.1, 1.25, 1.5, 1.75, 2.0, 2.25, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 6.0, 7.0, 8.0
	5 - 60	1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12
1"-1 1/4"	2 - 32	0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0, 2.25, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
	5 - 60	1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27
1 1/2"-2"	2 - 32	5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50
	5 - 60	8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70
2 1/2"	2 - 32	9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 60, 64, 68, 72, 76, 80
	5 - 60	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108, 112, 116, 120

Flows for sizes 3"-30" are available in increments of 5 GPM for PSID 2-32 and 5-60, and 10 GPM for PSID 3-20, 5-40 and 7-45.

Size	PSID	Max GPM	Size	PSID	Max GPM	Size	PSID	Max GPM
3"	2 - 32	135	8"	2 - 32	945	14"	2 - 32	2565
	5 - 60	170		5 - 60	1190		5 - 60	3230
	3 - 20	200		3 - 20	1400		3 - 20	3500
	5 - 40	250		5 - 40	1750		5 - 40	4750
4"	7 - 45	300	10"	7 - 45	2100	20"	7 - 45	5700
	2 - 32	270		2 - 32	1485		2 - 32	4320
	5 - 60	340		5 - 60	1670		5 - 60	5440
	3 - 20	460		3 - 20	2200		3 - 20	6400
6"	5 - 40	500	12"	5 - 40	2750	30"	5 - 40	8090
	7 - 45	600		7 - 45	3300		7 - 45	9600
	2 - 32	540		2 - 32	2025		2 - 32	9450
	5 - 60	680		5 - 60	2550		5 - 60	11900
	3 - 20	800		3 - 20	3000		3 - 20	14000
	5 - 40	1000		5 - 40	3750		5 - 40	17500
	7 - 45	1200		7 - 45	4500		7 - 45	21000

NOTE: 5", 16", 18" and 24" flows available, see specific submittal

15

Location

Camp Lejeune, NC

System

Valves



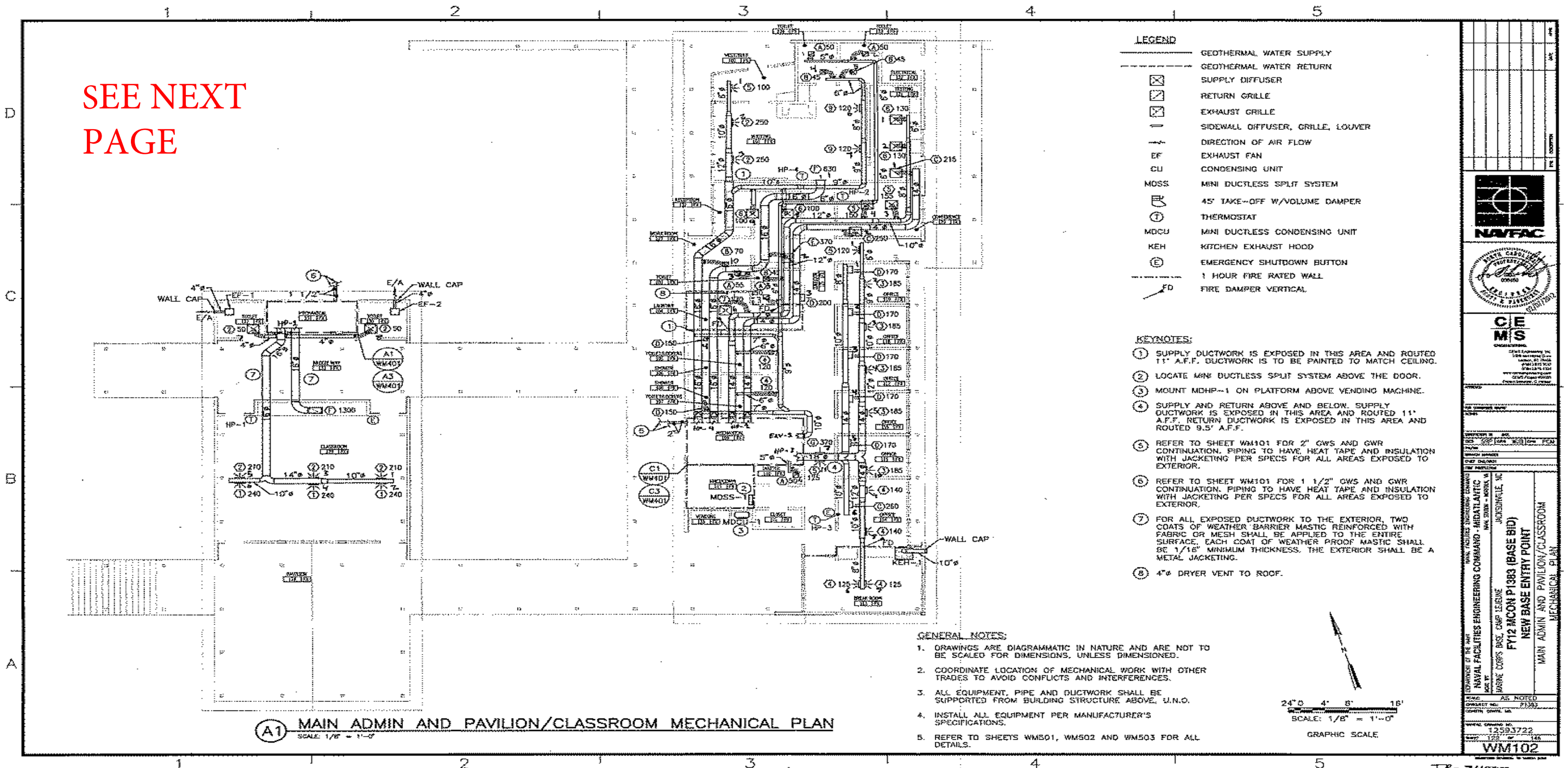
RESEARCH AIR FLO, INC.

System Diagram

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Project Address	Drawing Number	WM102
Camp Lejeune, NC	Floor Plan	Mechanical
	Drawing By	RCH
	System	Supply & Return

SEE NEXT
PAGE



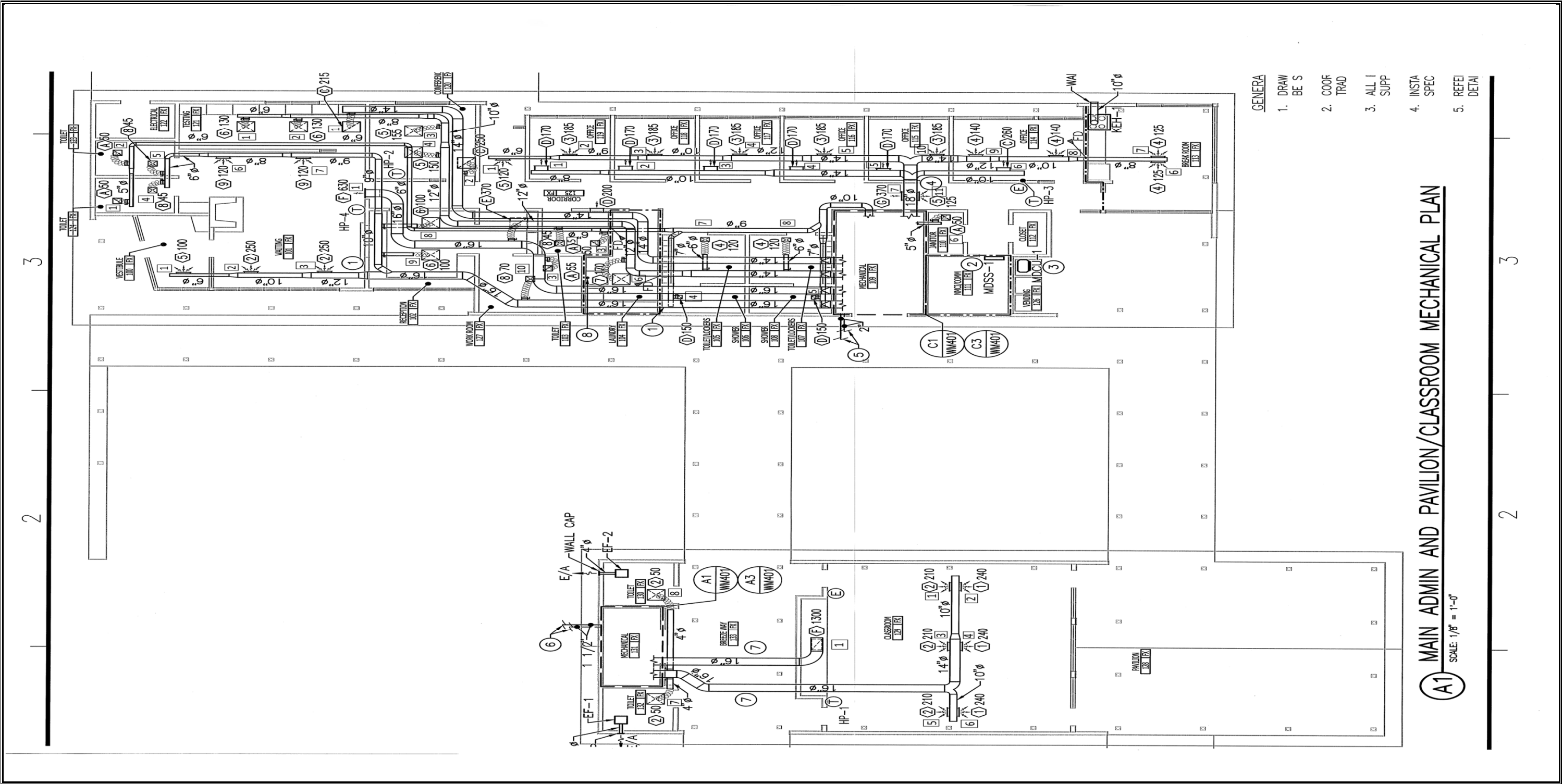


RESEARCH AIR FLO, INC.

System Diagram

Project: New Base Entry - Main Admin and Pavilion TB#: 24887

Project Address	Drawing Number	WM102
Camp Lejeune, NC	Floor Plan	Mechanical
	Drawing By	RCH
	System	Supply & Return



CONTRACTOR'S SUBMITTAL TRANSMITTAL LANTDIV NORFOLK 4-43553 (Rev. 11-80)		CONTRACT NO. N40085-12-C-7714	TRANSMITTAL NO. 07212016 1238 REV2	DATE 7/21/2016
FROM CONTRACTOR Dragados USA - (b)(6)		PROJECT TITLE AND LOCATION P1383 & P1384 - New Base Entry Point and Road at MCB Camp Lejeune		
TO Mr (b)(6) Supervisory Construction Manager				

CONTRACTOR USE ONLY				REVIEWER USE ONLY	
*List only one specification division per form List only one of the following categories on each transmittal form. and indicate which is being submitted <input checked="" type="checkbox"/> Contractor Approved <input type="checkbox"/> OICC Approval <input type="checkbox"/> Deviation/Substitution For OICC Approval				** ACTION CODES A-Approved D-Disapproved AN-Approved as noted RA-Receipt acknowledged C-Comments R-Resubmit	
ITEM NO	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO.	ITEM IDENTIFICATION (Type, size, model no., Mfg name, dwg. or brochure number)	NO. OF COPIES	ACTION CODES ***	REVIEWER'S INITIALS CODE AND DATE
1	23 05 93	Testing, Adjusting, And Balancing for HVAC	5,1		
		SD-06, Test Reports			
		Tab Report for HVAC at CLEO			

CONTRACTOR'S COMMENTS
 Attention/ Scott Parkhurst, Commissioning Agent, CEMS Engineering|Architecture
 The attached information is in support of the HVAC control systems for the **CLEO** buildings. The re-TAB was performed by Research Air Flo Inc. Attached is the TAB report for the HVAC system in CLEO, **REV 2**, based on Peter Glades last review; Page 10 , Total and return Airflow data for HP-2.

		(b)(6)	
		CONTRACTOR REPRESENTATIVE (Signature)	
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	TO	

☐ Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.
☐ Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

COPIES TO: ROICC (2) LANTDIV (1) A-E (1)	DATE	SIGNATURE
---	------	-----------

From: (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
To: (b)(6) NAVFAC MIDLANT, CI (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
Cc: (b)(6) (Group III Mgt.) (b)(6) (PM, Group III Management); (b)(6) (Group III Mgt Superintendent); (b)(6)
Subject: RE: TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS
Date: Monday, July 11, 2016 10:04:17

(b)(6) /All

(b)(6) will be onsite to do TAB and controls verification July 25th and 26th, and the morning of the 27th if necessary. Please have the appropriate subs on site.

(b)(6) PE
Supervisory Construction Manager
ROICC, Camp Lejeune, NC
(b)(6)

-----Original Message-----

From: (b)(6) [mailto:(b)(6)]
Sent: Thursday, July 07, 2016 2:32 PM
To: (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, CI; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune; (b)(6) NAVFAC MIDLANT, ROICC Camp Lejeune
(b)(6) (Group III Mgt.); (b)(6) (PM, Group III Management); (b)(6) (Group III Mgt Superintendent); (b)(6)
Subject: [Non-DoD Source] TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS

Good afternoon (b)(6) (b)(6). Attached are the revised TAB test reports for the CLEO building. It was reviewed and signed by my QC Manager. All changes identified by (b)(6) have been made. (b)(6) last comments are included at the end of the attachment. Request (b)(6) review and comment as soon as he is able. I am sending this digitally-only for now. Please advise if you feel hard copy should follow. I recommend sending hard copy for the files once this gets approved. Thanks. R/ (b)(6)

(b)(6) | Deputy Project Manager & Small Business Liaison | |

311 Parachute Tower Road | Camp Lejeune, NC 28542 |

Phone: w (b)(6) | c (b)(6) | Email: (b)(6)

Dragados USA, Inc. is An Equal Opportunity Employer

From: (b)(6)
To: (b)(6) [NAVFAC MIDLANT, ROICC Camp Lejeune](#); (b)(6) [NAVFAC MIDLANT, CI](#); (b)(6) [NAVFAC MIDLANT, ROICC Camp Lejeune](#); (b)(6) [NAVFAC MIDLANT, RIOCC Camp Lejeune](#)
Cc: (b)(6) [\(Group III Mgt.\)](#); (b)(6) [PM, Group III Management](#); (b)(6) [\(Group III Mgt Superintendent\)](#); (b)(6)
Subject: [Non-DoD Source] TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS
Date: Thursday, July 07, 2016 14:35:17
Attachments: [TRANSMITTAL 1238 REV 1, CLEO TAB TEST REPORTS.pdf](#)

Good afternoon (b)(6) (b)(6). Attached are the revised TAB test reports for the CLEO building. It was reviewed and signed by my QC Manager. All changes identified by (b)(6) have been made. (b)(6) last comments are included at the end of the attachment. Request (b)(6) review and comment as soon as he is able. I am sending this digitally-only for now. Please advise if you feel hard copy should follow. I recommend sending hard copy for the files once this gets approved. Thanks. R (b)(6)

(b)(6) | Deputy Project Manager & Small Business Liaison |

311 Parachute Tower Road | Camp Lejeune, NC 28542 |

Phone: w (b)(6) | c (b)(6) | Email: (b)(6)

Dragados USA, Inc. is An Equal Opportunity Employer

CONTRACTOR'S SUBMITTAL TRANSMITTAL LANTDIV NORFOLK 4-43553 (Rev. 11-80)		CONTRACT NO. N40085-12-C-7714	TRANSMITTAL NO. 07052016 1238 REV1	DATE 7/5/2016
FROM CONTRACTOR Dragados USA (b)(6)		PROJECT TITLE AND LOCATION P1383 & P1384 - New Base Entry Point and Road at MCB Camp Lejeune		
TO (b)(6) Supervisory Construction Manager				

CONTRACTOR USE ONLY				REVIEWER USE ONLY	
*List only one specification division per form List only one of the following categories on each transmittal form. and indicate which is being submitted <input checked="" type="checkbox"/> Contractor Approved <input type="checkbox"/> OICC Approval <input type="checkbox"/> Deviation/Substitution For OICC Approval				** ACTION CODES A-Approved D-Disapproved AN-Approved as noted RA-Receipt acknowledged C-Comments R-Resubmit	
ITEM NO	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO.	ITEM IDENTIFICATION (Type, size, model no., Mfg name, dwg. or brochure number)	NO. OF COPIES	ACTION CODES ***	REVIEWER'S INITIALS CODE AND DATE
1	23 05 93	Testing, Adjusting, And Balancing for HVAC	5,1		
		SD-06, Test Reports			
		Tab Report for HVAC at CLEO			

CONTRACTOR'S COMMENTS

Attention/ Scott Parkhurst, Commissioning Agent, CEMS Engineering|Architecture
 The attached information is in support of the HVAC control systems for the CLEO buildings. The re-TAB was performed by Research Air Flo Inc. Attached is the TAB report for the HVAC system in CLEO, REV 1, based on Peter Glades last review.

(b)(6)

		CONTRACTOR REPRESENTATIVE (Signature)	
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	TO	

- ☐ Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.
- ☐ Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

COPIES TO: ROICC (2) LANTDIV (1) A-E (1)	DATE	SIGNATURE
---	------	-----------



RESEARCH AIR FLO, INC.

5571 PEACHTREE ROAD
ATLANTA, GEORGIA 30341
770-452-8292 (Office)
770-455-6209 (Fax)

To: Group III Management
2820 West Vernon Avenue
Kinston, NC 28504

Date: July 5, 2016

Job: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

Job No: 24887

Attention: _____

WE TRANSMIT TO YOU THE FOLLOWING ITEM:

1. LETTERS
2. REPORTS
3. SURVEY

4. COMPANY SUBMITTAL
5. AGENDA/PROCEDURES
6. OTHER: _____

On subject job, prepared by (b)(6) / (b)(6)

Copies	Item Number	Description	For Engineers Approval	For Your Information	Revision	Supplemental	Returning Loaned Material	
	2	Certified Test & Balance Report	X	X				

Remarks: We appreciate your business.

cc: _____

Sincerely,

RESEARCH AIR FLO, INC.

By: _____

RESEARCH AIR FLO, INC.

5571 Peachtree Road - Atlanta, Georgia 30341

Phone 770.452.8292 - Fax 770.455.6209

www.researchairflo.com



Certified Test, Adjust and Balance Report

Date: June 9, 2016

Project TB#: 24887

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

Address: Camp Lejeune, NC

Architect: N/A

Engineer: CEMS Engineering, Inc.

Ladson, SC

HVAC Contractor: Group III Management

Kinston, NC

RESEARCH AIR FLO, INC.

Table Of Contents

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion **TB#:** 24887

Page	Description
	Cover
1	Table Of Contents
2	Certification
3	Instrumentation
4	Nomenclature
5	ERV-1-SF
6	ERV-1-EF
7	ERV-1 Exhaust Distribution
8	HP-1
9	HP-1 Supply Distribution
10	HP-2
11	HP-2 Sup & Ret Dist.
12	HP-3
13	HP-3 Sup & Ret Dist.
14	HP-4
15	HP-4 Sup & Ret Dist.
16	MDSS-1
17	MDSS-2
18	EF-1 & EF-2 Fan Test
19	EF-3 Fan Test
20	Traverse
21	Electric Heater
22	P-1 & P-2 Pump Test
23	P-3 Pump Test
24	HPWH-1 Heating Coil Test
25	HP-1 & HP-2 Heating Coil Test
26	HP-3 & HP-4 Heating Coil Test
27-32	Curves & Charts

[illegible]



RESEARCH AIR FLO, INC.

Report Certification

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Specified tolerances:

Air Handling Units - 5% / + 5% Air Distribution - 5% / + 5%

Pumps - 5% / + 5% Water Distribution - 5% / + 5%

THE DATA PRESENTED IN THIS REPORT IS A RECORD OF SYSTEM MEASUREMENTS AND FINAL ADJUSTMENTS THAT HAVE BEEN OBTAINED IN ACCORDANCE WITH THE CURRENT EDITION OF THE NEBB PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS.

ANY VARIANCES FROM DESIGN QUANTITIES, WHICH EXCEED NEBB TOLERANCES, ARE NOTED IN THE TEST- ADJUST- BALANCE REPORT PROJECT SUMMARY.

Submitted and Certified by:

(b)(6)

NEBB CERTIFIED PROFESSIONAL

Report Certification Date: July 6, 2016

Research Air Flo, Inc.

Certification Number: 3209

Expiration Date: 3/31/2018

(b)(6)

Signature above



RESEARCH AIR FLO, INC.

Instrumentation Calibration

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion **TB#:** 24887

[illegible]

N/C/R = No Calibration Required



RESEARCH AIR FLO, INC.

Nomenclature

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Airflow Data		
CFM	=	Cubic Feet Per Minute
FPM	=	Feet Per Minute
SA	=	Supply Air
RA	=	Return Air
OA	=	Outside Air
EA	=	Exhaust Air

Waterflow Data		
GPM	=	Gallons Per Minute
CHW	=	Chilled Water
HW	=	Hot Water
CW	=	Condenser Water
PW	=	Process Water

Air Pressure Data		
TSP	=	Total Static Pressure (in.wc.)
ESP	=	External Static Pressure (in.wc.)
SP	=	Static Pressure (in.wc.)
ΔP or DP	=	Differential Pressure
OTA	=	Open To Atmosphere

Water Pressure Data		
FT	=	Feet Of Water Column
IN	=	Inches Of Water Column
IN HG	=	Inches Of Mercury
PSI	=	Pounds Per Square Inch
ΔP or DP	=	Differential Pressure

Temperature Data (°F)		
EAT DB	=	Entering Air Temp. Dry Bulb
LAT DB	=	Leaving Air Temp. Dry Bulb
EAT WB	=	Entering Air Temp. Wet Bulb
LAT WB	=	Leaving Air Temp. Wet Bulb
EWT	=	Entering Water Temperature
LWT	=	Leaving Water Temperature
ΔT or DT	=	Differential Temperature

Electrical Data		
HP	=	Horsepower
KW	=	Kilowatts
FLA	=	Full Load Amps
BHP	=	Brake Horsepower
VFD	=	Variable Frequency Drive
ECM	=	Electronically Commutated Motor
VSM	=	Variable Speed Motor
VSC	=	Variable Speed Controller
MSM	=	Multiple Speed Motor

Distribution Data		
CD	=	Ceiling Diffuser
SD	=	Slot Diffuser
SG	=	Supply Grille
LFD	=	Laminar Flow Diffuser
FG	=	Floor Grille
RG	=	Return Grille
EG	=	Exhaust Grille
ES	=	Exhaust Slot

Miscellaneous		
LT	=	Light Troffer
CSD	=	Continuous Slot Diffuser
°F	=	Degrees Fahrenheit
DD	=	Direct Drive
HEPA	=	High Efficiency Particulate Air
BAS	=	Building Automation System
LSD	=	Linear Supply Diffuser
RVA	=	Rotating Vane Anemometer



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 5/25/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
ERV-1-SF	GreenHeck	MV-750-PSC-QD-115	13967587	Mechanical	HPs 2,3,4

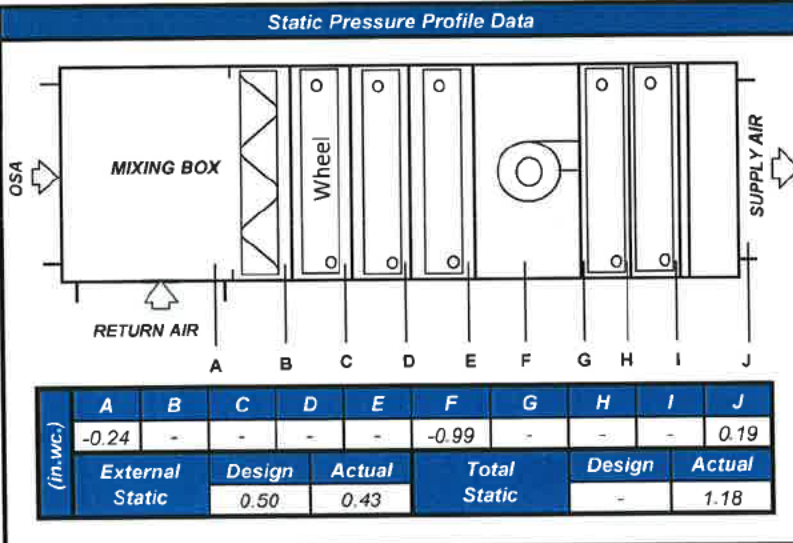
Airflow Data			
CFM		Design	Actual
	Outlet Total	720	726
	Unit Total	720	726
	Return	-	-
	OSA	720	726

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	7.8	5.6
Average Volts	115	122
Motor RPM	1350	DD
Fan RPM	-	DD
Motor Manuf.	NL	
Motor HP	0.3	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	HP-2 OSA	HP-3 OSA	HP-4 OSA
Width	8.0	8.0	8.0
Height	8.0	8.0	8.0
Ø Dia.	-	-	-
Area (ft ²)	0.56	0.44	0.44
Actual FPM	631	512	336
Design FPM	634	500	330
S.P. (in. wc.)	.05	-.13	0.0

Cooling BTU		Design	Actual
	Total	27637	25025
	Sensible	6920	6586

Apparatus Coil Data								Flow Control Device Data			
Summer	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"
	Design	90.0	79.0	81.1	70.0	-	-	-	-	-	-
	Actual	88.7	78.0	80.3	69.8	-	-	-	-	-	-
Winter	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"
	Design	23.0	19.3	49.6	41.1	-	-	-	-	-	-
	Actual	-	-	-	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
ERV-1-EF	GreenHeck	MV-750-PSC-QD-115	13967587	Mechanical 109	Exhaust Bathrooms

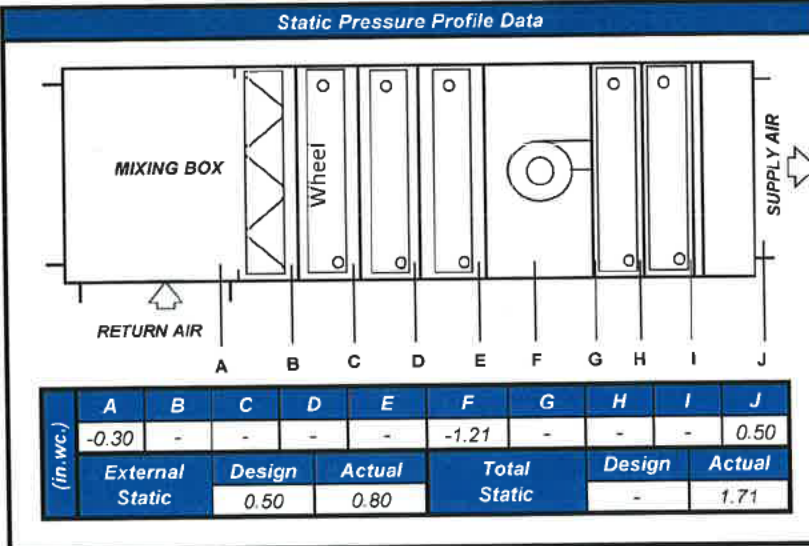
Airflow Data			
CFM		Design	Actual
	Outlet Total	500	505
	Unit Total	500	505
	Return	-	-
	OSA	-	-

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	7.8	6.2
Average Volts	115	122
Motor RPM	1350	DD
Fan RPM	-	DD
Motor Manuf.	NL	
Motor HP	0.3	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Exh. In	Exh. In	-
Width	-	-	-
Height	-	-	-
Ø Dia.	6.0	10.0	-
Area (ft ²)	0.20	0.55	-
Actual FPM	265	822	-
Design FPM	250	818	-
S.P. (in. wc.)	-0.02	-0.27	-

Cooling BTU		Design	Actual
	Total	45382	42109
	Sensible	6912	6436

Apparatus Coil Data										Flow Control Device Data			
Summer	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	RH%	Manufacturer	-		
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	75.0	50.0	87.8	76.9	-	-	-	50.0	-	-	-	-
	Actual	71.8	48.9	83.6	74.6	-	-	-	-	-	-	-	-
Winter	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	RH%	Manufacturer	-		
	Heat Wheel	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	-	ΔP
	Design	68.0	35.0	29.6	25.2	-	-	-	-	-	-	-	-
	Actual	-	-	-	-	-	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-1	ClimateMaster	TTV049	S14828806	Mechanical 131	Classroom 129

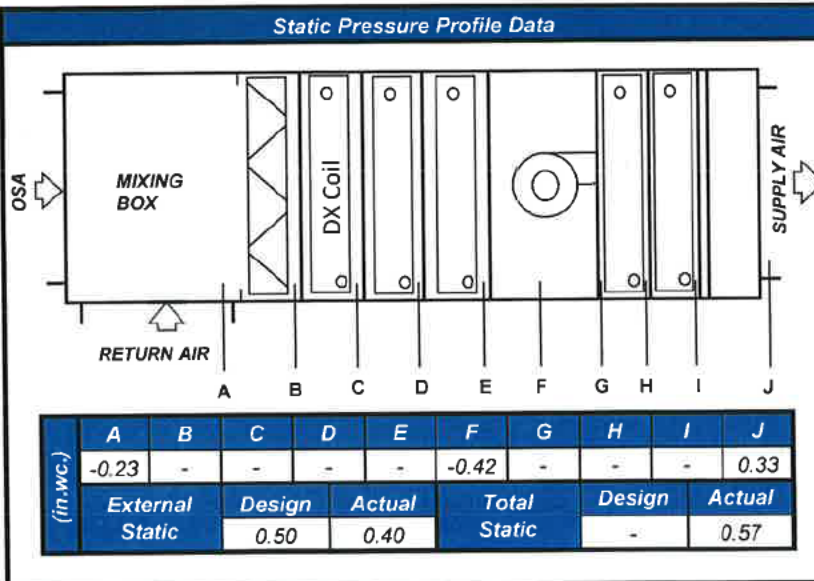
Airflow Data			
CFM		Design	Actual
	Outlet Total	1450	1500
	Unit Total	1450	1515 (2)
	Return	1300	1371
	OSA	150	145

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	6.9	2.6
Average Volts	240	212
Motor RPM	NL	Med-High
Fan RPM	-	Med-High
Motor Manuf.	U.S. Motor	
Motor HP	1.0	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Sup 1-6	Return	OSA
Width	-	-	-
Height	-	-	-
Ø Dia.	16.0	16.0	8.0
Area (ft ²)	1.40	1.40	0.35
Actual FPM	1011	979	415
Design FPM	1036	929	429
S.P. (in. wc.)	.29	-.21	.05

Cooling BTU		Design	Actual
	Total	37000	39132
	Sensible	27000	26670

Cooling	Apparatus Coil Data									Flow Control Device Data			
	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	78.0	65.0	60.8	56.8	-	-	-	12.0	Auto Flow	-	-	2-32
	Actual	65.8	57.9	49.5	48.2	70.2	76.3	15.7	12.0	Auto Flow	1.50	-	7.0

Remarks:

- 1) Speed section 3 with CFM Adjust on +5%
- 2) Unit total is sup 1-6 traverse with grille 7-8 added.



Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion **TB#:** 24887
Test Date: 6/8/2016 **Tested By:** (b)(6)

[illegible]

Page 9



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
 Test Date: 6/7/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-2	ClimateMaster	TTV038	S14625322	Mechanical 109	Conference 120

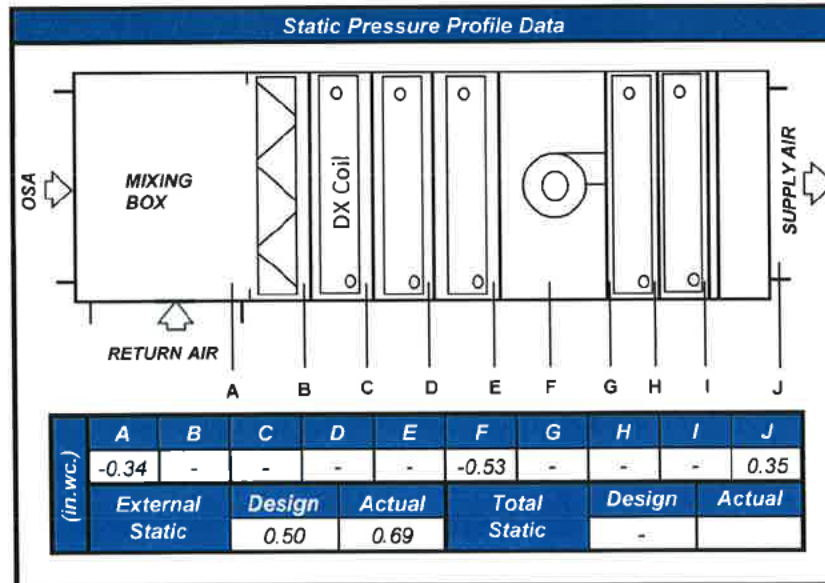
Airflow Data			
CFM		Design	Actual
	Outlet Total	1020	1016
	Unit Total	1020	1054
	Return	665	701
	OSA	355	353

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	3.9	2.2
Average Volts	240	209
Motor RPM	NL	High
Fan RPM	-	High
Motor Manuf.	U.S. Motor	
Motor HP	0.5	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply	Return	OSA
Width	-	-	8.0
Height	-	-	10.0
Ø Dia.	14.0	14.0	-
Area (ft ²)	1.07	1.07	0.56
Actual FPM	992	662	631
Design FPM	953	621	634
S.P. (in. wc.)	.35	.34	-.05

Cooling BTU		Design	Actual
	Total	40100	37862
	Sensible	21400	23147

Apparatus Coil Data										Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	77.0	60.8	57.6	46.2	-	-	-	9.0	-	-	-	2-32
	Actual	70.4	56.4	50.2	42.0	70.3	77.9	7.2	9.0	Auto Flow	1.50	-	6.3

Remarks:

- 1) Speed section 4 with CFM adjust on -5%



RESEARCH AIR FLO, INC.

Air Distribution Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016

Tested By: (b)(6)

Unit No.	HP-2	Service	Supply	Dwg No.	WM102	Design CFM	1020	Actual CFM	1016		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
121	1	CD	8"Ø	*	*	130	*	116	*	124	
121	2	CD	8"Ø	*	*	130	*	110	*	132	
120	3	CD	8"Ø	*	*	155	*	134	*	160	
120	4	CD	8"Ø	*	*	150	*	129	*	155	
103	5	CD	6"Ø	*	*	45	*	110	*	47	
104	6	CD	8"Ø	*	*	170	*	133	*	163	
105	7	CD	6"Ø	*	*	120	*	139	*	115	
107	8	CD	6"Ø	*	*	120	*	111	*	120	

Unit No.	HP-2	Service	Return	Dwg No.	WM102	Design CFM	665	Actual CFM	685		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
121	1	RG	8"Ø	*	*	215	*	137	*	219	
120	2	RG	8"Ø	*	*	250	*	264	*	262	
125	3	RG	8x6	*	*	200	*	260	*	204	

Remarks: * Flow Hood Measurements



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
 Test Date: 6/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-3	ClimateMaster	TTV049	S14828804	Mechanical 109	Office 114

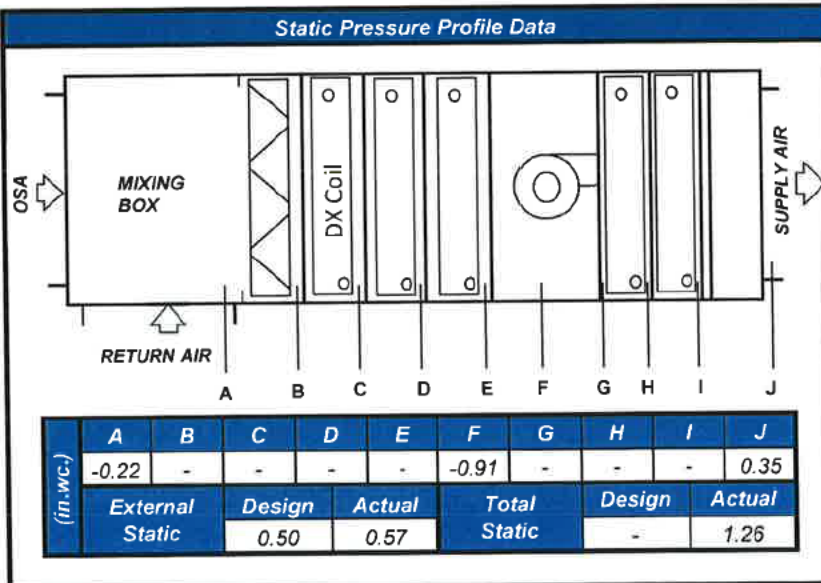
Airflow Data			
CFM		Design	Actual
	Outlet Total	1700	1700
	Unit Total	1700	1765
	Return	1480	1540
	OSA	220	225

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	6.9	3.4
Average Volts	240	207
Motor RPM	NL	High
Fan RPM	-	High
Motor Manuf.	U.S. Motor	
Motor HP	1.0	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply	Return	OSA
Width	-	-	8.0
Height	-	-	8.0
Ø Dia.	18.0	18.0	-
Area (ft ²)	1.77	1.77	0.44
Actual FPM	997	870	512
Design FPM	960	836	500
S.P. (in. wc.)	.35	-.16	-.13

Cooling BTU		Design	Actual
	Total	47500	45511
	Sensible	39200	37552

Apparatus Coil Data										Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.	Type		Size"	Position	ΔP	
	Design	77.0	59.7	55.6	49.5	-	-	-	12.0	-	-	-	2-32
	Actual	69.5	52.4	49.8	41.5	70.3	77.1	11.5	12.0	Auto Flow	1.50	-	4.0

Remarks:

- Speed tap setting 4, with CFM adjust at +5%



RESEARCH AIR FLO, INC.

Air Distribution Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016 Tested By: (b)(6)

Unit No.	HP-3	Service	Supply	Dwg No.	WM102	Design CFM	1700	Actual CFM	1700		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
125	1	SG	10X3	0.11	1091	120	864	95	1055	116	
119	2	SG	12X4	0.18	1028	185	906	163	1072	193	
118	3	SG	12X4	0.18	1028	185	1078	194	1050	189	
117	4	SG	12X4	0.18	1028	185	817	147	1000	180	
116	5	SG	12X4	0.18	1028	185	956	172	1028	185	
113	6	SG	12X3	0.14	893	125	807	113	900	126	
113	7	SG	12X3	0.14	893	125	786	110	879	123	
114	8	SG	12X3	0.14	1000	140	1100	154	993	139	
114	9	SG	12X3	0.14	1000	140	964	135	1014	142	
115	10	SG	12X4	0.18	1028	185	1061	191	1006	181	
125	11	SG	10X3	0.11	1136	125	1418	156	1145	126	

Unit No.	HP-3	Service	Return	Dwg No.	WM102	Design CFM	1480	Actual CFM	1484		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
119	1	RG	8X6	0.26	654	170	535	139	665	173	
118	2	RG	8X6	0.26	654	170	542	141	638	166	
117	3	RG	8X6	0.26	654	170	604	157	662	172	
116	4	RG	8X6	0.26	654	170	708	184	650	169	
115	5	RG	8X6	0.26	654	170	588	153	673	175	
114	6	RG	10X6	0.34	765	260	874	297	794	270	
125	7	RG	12X8	0.57	649	370	719	410	630	359	

Remarks: * Flow Hood Measurements



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/7/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
HP-4	ClimateMaster	TTV038	S14625321	Mechanical 109	Waiting 101

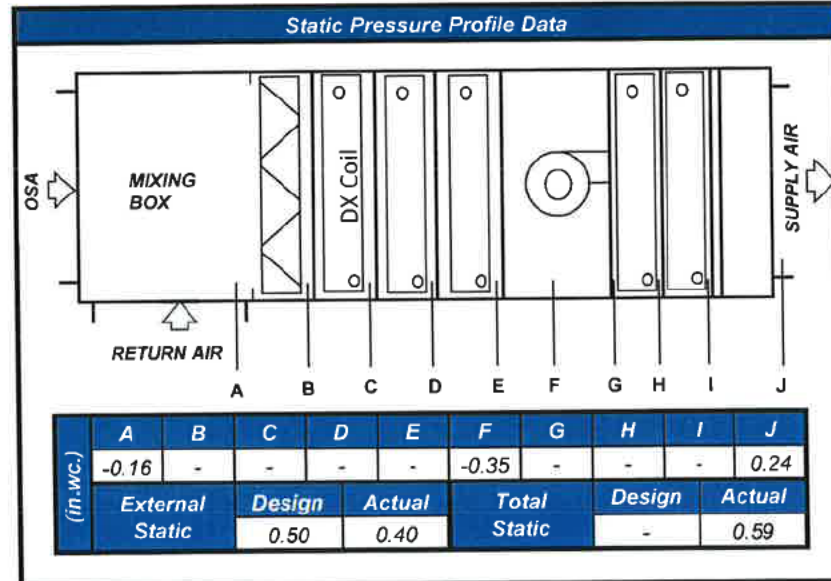
Airflow Data			
CFM		Design	Actual
	Outlet Total	1200	1169
	Unit Total	1200	1186
	Return	1055	1037
	OSA	145	148

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	3.9	0.9
Average Volts	240	212
Motor RPM	NL	Med
Fan RPM	-	Med
Motor Manuf.	U.S. Motor	
Motor HP	0.5	
Phase	1	
Motor Frame	NL	
Service Factor	NL	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply	Return	OSA
Width	-	-	8.0
Height	-	-	8.0
Ø Dia.	16.0	16.0	-
Area (ft ²)	1.40	1.40	0.44
Actual FPM	847	741	336
Design FPM	857	754	330
S.P. (in.-wc.)	.24	-.13	0

Cooling BTU		Design	Actual
	Total	37000	33623
	Sensible	26900	25618

Apparatus Coil Data										Flow Control Device Data			
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	Flow Design		
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP
	Design	76.0	58.9	55.2	47.3	-	-	-	9.0	-	-	-	2-32
	Actual	70.9	52.4	50.9	40.3	70.2	78.1	11.7	9.0	Auto Flow	1.50	-	5.2

Remarks:

1) Speed section 3



RESEARCH AIR FLO, INC.

Air Distribution Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
 Test Date: 6/7/2016 Tested By: (b)(6)

Unit No.	HP-4	Service	Supply	Dwg No.	WM102	Design CFM	1200	Actual CFM	1169		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
100	1	SG	10x3	0.11	909	100	685	75	889	98	
101	2	SG	14x4	0.22	1136	250	610	134	1113	245	
101	3	SG	14x4	0.22	1136	250	660	145	1084	238	
124	4	CD	6"Ø	*	*	45	*	88	*	43	
123	5	CD	6"Ø	*	*	45	*	68	*	43	
101	6	SG	10x6	0.24	500	120	455	109	481	115	
101	7	SG	10x6	0.24	500	120	540	130	490	118	
102	8	CD	6"Ø	*	*	100	*	71	*	97	
102	9	CD	6"Ø	*	*	100	*	120	*	103	
127	10	CD	6"Ø	*	*	70	*	124	*	69	

Unit No.	HP-4	Service	Return	Dwg No.	WM102	Design CFM	1055	Actual CFM	1011		
Area Served	Grille Number	Code/ Type	Size	Free Area	Design CFM		Initial Data		Final Data		Note
					FPM	CFM	FPM	CFM	FPM	CFM	
101	1	RG	18x10	*	*	630	*	673	*	605	
127	2	RG	10"Ø	*	*	370	*	67	*	353	
127	3	RG	6"Ø	*	*	55	*	175	*	53	

Remarks: * Flow Hood Measurements



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
MDSS-1	LG	LSN180HSV4	412KAGSQW007	Wall	NMCI / Comm 111

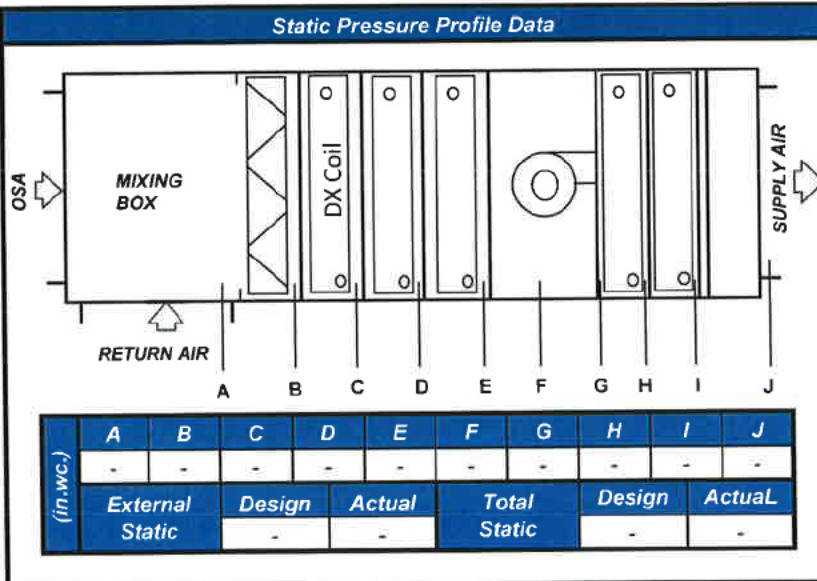
Airflow Data			
CFM		Design	Actual
	Outlet Total	-	-
	Unit Total	600	584
	Return	600	584
	OSA	-	-

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	0.4	0.4
Average Volts	208	208
Motor RPM	ID	High
Fan RPM	-	High
Motor Manuf.	ID	
Motor HP	ID	
Phase	1	
Motor Frame	ID	
Service Factor	ID	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply		
Width	30.0		
Height	3.0		
Ø Dia.	-		
Area (ft ²)	0.63		
Actual FPM	927		
Design FPM	952		
S.P. (in.wc.)	-		

Cooling BTU		Design	Actual
	Total	18000	19053
	Sensible	-----	15642

Cooling	Apparatus Coil Data									Flow Control Device Data				
	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	-			
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP	
	Design	80.0	63.0	-	52.8	-	-	-	-	-	-	-	-	-
	Actual	68.3	55.4	43.5	42.1	-	-	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Air Handling Unit Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
 Test Date: 3/8/2016 Tested By: (b)(6)

Unit Number	Manufacturer	Model Number	Serial Number	Location	Area Served
MDSS-2	LG	LSN180HSV4	412KACOW003	Wall	Station 206

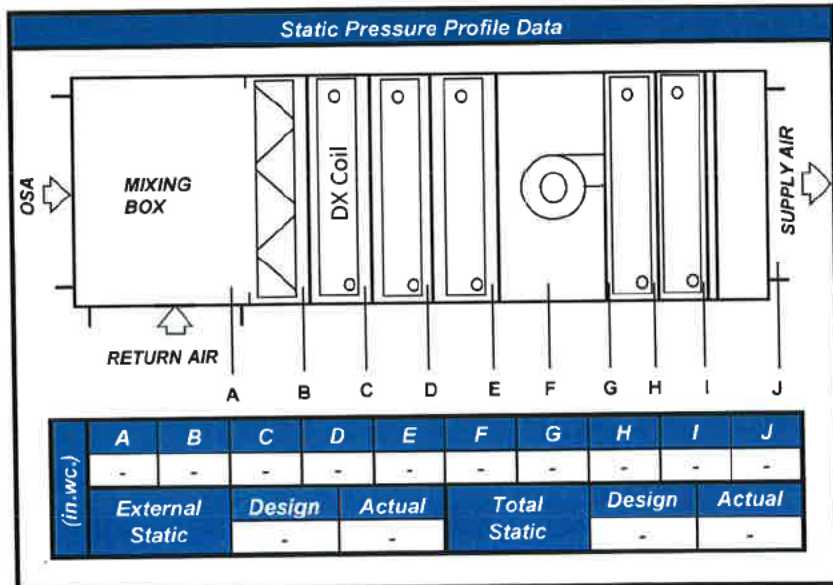
Airflow Data			
CFM		Design	Actual
	Outlet Total	-	-
	Unit Total	500	485
	Return	500	485
	OSA	-	-

Miscellaneous Data	
SP Setpoint (In.)	-
VFD Setting (HZ.)	-

Motor / Fan Data		
	Design	Actual
Average Amps	0.4	0.4
Average Volts	208	209
Motor RPM	ID	Med
Fan RPM	-	Med
Motor Manuf.	ID	
Motor HP	ID	
Phase	1	
Motor Frame	ID	
Service Factor	ID	

Drive Data	
Fan Sheave	Direct Drive
Fan Bore	Direct Drive
Motor Sheave	Direct Drive
Motor Bore	Direct Drive
Belt Size	Direct Drive
Belt Quantity	Direct Drive
Center Distance	Direct Drive
Turns Open**	Direct Drive
Motor Mount	Inches In -
Adjustment	Inches Out -

** Applies to variable pitch sheaves



Traverse Data (Inside Dimensions)			
Service	Supply		
Width	30.0		
Height	3.0		
Ø Dia.	-		
Area (ft ²)	0.63		
Actual FPM	771		
Design FPM	794		
S.P. (in. wc.)	-		

Cooling BTU		Design	Actual
	Total	19500	19490
	Sensible	-----	15138

Apparatus Coil Data										Flow Control Device Data				
Cooling	Service	Entering Air		Leaving Air		Water °F		Coil ΔP'	GPM	Manufacturer	-			
	DX	db °F	wb °F	db °F	wb °F	Ent.	Lvg.			Type	Size"	Position	ΔP	
	Design	80.0	63.0	-	49.2	-	-	-	-	-	-	-	-	-
	Actual	70.4	56.8	41.5	40.4	-	-	-	-	-	-	-	-	-

Remarks:



RESEARCH AIR FLO, INC.

Fan Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/8/2016

Tested By: (b)(6)

Unit Data		Notes	
Fan Number	EF-1		
Service	Female Toilet		
Manufacturer	Panasonic		
Model Number	FV-05-11VKS1		
Airflow Data	Design	Actual	Notes
CFM (Unit Total)	50	52	
CFM (Connected Load)	-	-	
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)	0.25	-	(1)
Suction (in.wc.)	-	-	
Discharge (in.wc.)	-	-	
Motor / Fan Data	Rated	Actual	Notes
Voltage	120	119	
Amps	0.3	0.1	
Motor RPM	NL	DD	
Fan RPM	-	DD	
Motor Manufacturer	ID		
Motor HP	ID		
Phase	1		
Service Factor	ID		
VFD Setting (HZ.)	ID		
Drive Data			Notes
Fan Sheave Size	Direct Drive		
Fan Bore Size	Direct Drive		
Motor Sheave Size	Direct Drive		
Motor Bore Size	Direct Drive		
Belt Size	Direct Drive		
Number Of Belts	Direct Drive		
Center Distance	Direct Drive		

Unit Data		Notes	
Fan Number	EF-2		
Service	Male Toilet		
Manufacturer	Panasonic		
Model Number	FV-05-11VKS1		
Airflow Data	Design	Actual	Notes
CFM (Unit Total)	50	51	
CFM (Connected Load)	-	-	
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)	0.25	-	(1)
Suction (in.wc.)	-	-	
Discharge (in.wc.)	-	-	
Motor / Fan Data	Rated	Actual	Notes
Voltage	120	119	
Amps	0.3	0.1	
Motor RPM	NL	DD	
Fan RPM	-	DD	
Motor Manufacturer	ID		
Motor HP	ID		
Phase	1		
Service Factor	ID		
VFD Setting (HZ.)	ID		
Drive Data			Notes
Fan Sheave Size	Direct Drive		
Fan Bore Size	Direct Drive		
Motor Sheave Size	Direct Drive		
Motor Bore Size	Direct Drive		
Belt Size	Direct Drive		
Number Of Belts	Direct Drive		
Center Distance	Direct Drive		

Remarks:

- 1) Static too low to read.



RESEARCH AIR FLO, INC.

Fan Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 3/9/2016 Tested By: (b)(6)

Unit Data		Notes	
Fan Number	EF-3		
Service	Vehicle Bay		
Manufacturer	GrenHeck		
Model Number	SEI-12-432-E-X		
Airflow Data	Design	Actual	Notes
CFM (Unit Total)	300	311	
CFM (Connected Load)	-	-	
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)	0.25	-	
Suction (in.wc.)	-	-	
Discharge (in.wc.)	-	-	
Motor / Fan Data	Rated	Actual	Notes
Voltage	115	119	
Amps	1.6	1.3	
Motor RPM	1550	DD	
Fan RPM	-	DD	
Motor Manufacturer	McMillan		
Motor HP	0.13		
Phase	1		
Service Factor	NL		
VFD Setting (HZ.)	-		
Drive Data		Notes	
Fan Sheave Size	Direct Drive		
Fan Bore Size	Direct Drive		
Motor Sheave Size	Direct Drive		
Motor Bore Size	Direct Drive		
Belt Size	Direct Drive		
Number Of Belts	Direct Drive		
Center Distance	Direct Drive		

Remarks:

Unit Data		Notes	
Fan Number			
Service			
Manufacturer			
Model Number			
Airflow Data	Design	Actual	Notes
CFM (Unit Total)			
CFM (Connected Load)			
Pressure Data	Design	Actual	Notes
Total SP (in.wc.)			
Suction (in.wc.)	-		
Discharge (in.wc.)	-		
Motor / Fan Data	Rated	Actual	Notes
Voltage			
Amps			
Motor RPM			
Fan RPM			
Motor Manufacturer			
Motor HP			
Phase			
Service Factor			
VFD Setting (HZ.)			
Drive Data		Notes	
Fan Sheave Size			
Fan Bore Size			
Motor Sheave Size			
Motor Bore Size			
Belt Size			
Number Of Belts			
Center Distance			



Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
Test Date: 3/9/2016 Tested By: (b)(6)

Remarks:



RESEARCH AIR FLO, INC.

Electric Heater Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
Test Date: 3/8/16 - 3/22/16 Tested By: (b)(6)

Unit Number		KW	Ø	Volts				Amps				CFM	Air Temp. (°F)			Notes
				L1-L2	L1-L3	L2-L3	Avg.	L1	L2	L3	Avg.		Ent.	Lvg.	ΔT	
UH-A	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.9	1	213	-	-	213	8.7	-	-	8.7	536	75.4	86.6	11.2	(1)
UH-B	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.9	1	213	-	-	213	8.8	-	-	8.8	613	79.1	88.9	9.8	(1)
UH-C	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.8	1	209	-	-	209	8.6	-	-	8.6	470	64.9	77.0	12.1	(1)
UH-D	Design	2.0	1	208	-	-	208	9.6	-	-	9.6	-	-	-		
	Actual	1.8	1	208	-	-	209	8.7	-	-	8.7	409	59.2	73.1	13.9	(1)
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															
	Design												-	-		
	Actual															

Remarks:

- 1) CFM Calculated from Delta T



RESEARCH AIR FLO, INC.

Pump Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
 Test Date: 5/27/2016 & 7/1/16 Tested By: (b)(6)

Pump Data			Notes		
	Pump Number	P-1			
	Service	Geothermal			
	Pump Manuf.	Bell & Gossett			
	Model Number	90 1.25AA 4.375 BF			
	Serial Number	C196636-01 L41			
	Impeller Size (In.)	4.375			
Water Data			GPM	Notes	
	Design	46.0			
	Final	48.0			
	Wide Open	52.0			
Pressure Data			Psi.	Ft.	Notes
	Wide Open ΔP	22.8	52.7		
	No Flow Discharge	56.2	-		
	No Flow Suction	25.1	-		
	No Flow Head ΔP	31.1	71.8		
	Final Discharge	63.1	-		
	Final Suction	39.8	-		
	Final Head ΔP	23.3	53.8		
	Design Head ΔP	-	54.0		
	Pump Off (Psi)	25.1			
	ΔP Setpoint (Psi)	-			
Motor / Electrical Data			Rated	Actual	Notes
	Motor RPM	3450	DD		
	Volts	208	214		
	Amps	9.1	6.8		
	Corrected FLA	8.8			
	Motor HP	1.5			
	Phase	1			
	Motor Manuf.	Marathon			
	Service Factor	1.30			
	Calculated BHP	1.2			
	VFD Setting (HZ.)	-			

Pump Data			Notes	
	Pump Number	P-2		
	Service	HPWH-1 Load		
	Pump Manuf.	Bell & Gossett		
	Model Number	PL-36B		
	Serial Number	1BLOO3LF		
	Impeller Size (In.)	-		
Water Data		GPM	Notes	
	Design	5.0		
	Final	5.0	(1)	
	Wide Open	9.0		
Pressure Data		Psi.	Ft.	Notes
	Wide Open ΔP	13.2	30.5	
	No Flow Discharge	70.2	-	
	No Flow Suction	54.9	-	
	No Flow Head ΔP	15.3	35.3	
	Final Discharge	66.4	-	
	Final Suction	53.2	-	
	Final Head ΔP	13.2	30.5	
	Design Head ΔP	-	4.0	
	Pump Off (Psi)	30.3		
	ΔP Setpoint (Psi)	-		
Motor / Electrical Data		Rated	Actual	Notes
	Motor RPM	3300	DD	
	Volts	115	121	
	Amps	2.1	1.7	
	Corrected FLA	2.0		
	Motor HP	0.2		
	Phase	1		
	Motor Manuf.	Bell & Gossett		
	Service Factor	NL		
	Calculated BHP	0.1		
	VFD Setting (HZ.)	-		

Remarks:

- 1) Actual system pressure is over pump capacity.



RESEARCH AIR FLO, INC.

Pump Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887
 Test Date: 7/1/2016 Tested By: (b)(6)

Pump Data			Notes	
	Pump Number	P-3	(1)	
	Service	Recirculating		
	Pump Manuf.	Bell & Gossett		
	Model Number	NBF-22		
	Serial Number	103252LF		
	Impeller Size (In.)	-		
Water Data	GPM		Notes	
	Design	NL	(1)	
	Final	0.0		
	Wide Open	0.0		
Pressure Data		Psi.	Ft.	Notes
	Wide Open ΔP	6.6	15.2	
	No Flow Discharge	57.6	-	
	No Flow Suction	51.0	-	
	No Flow Head ΔP	6.6	15.2	
	Final Discharge	57.6	-	
	Final Suction	51.0	-	
	Final Head ΔP	6.6	15.2	
	Design Head ΔP	-	NL	
	Pump Off (Psi)	59.9		
	ΔP Setpoint (Psi)	-		
Motor / Electrical Data		Rated	Actual	Notes
	Motor RPM	2940	-	
	Volts	115	119	
	Amps	0.8	0.5	
	Corrected FLA	-		
	Motor HP	0.12		
	Phase	1		
	Motor Manuf.	Bell & Gossett		
	Service Factor	NL		
	Calculated BHP	-		
	VFD Setting (HZ.)	-		

Pump Data			Notes	
	Pump Number			
	Service			
	Pump Manuf.			
	Model Number			
	Serial Number			
	Impeller Size (In.)			
Water Data	GPM		Notes	
	Design			
	Final			
	Wide Open			
Pressure Data		Psi.	Ft.	Notes
	Wide Open ΔP			
	No Flow Discharge		-	
	No Flow Suction		-	
	No Flow Head ΔP			
	Final Discharge		-	
	Final Suction		-	
	Final Head ΔP			
	Design Head ΔP			
	Pump Off (Psi)			
	ΔP Setpoint (Psi)			
Motor / Electrical Data		Rated	Actual	Notes
	Motor RPM			
	Volts			
	Amps			
	Corrected FLA			
	Motor HP			
	Phase			
	Motor Manuf.			
	Service Factor			
	Calculated BHP			
	VFD Setting (HZ.)			

Remarks:

- 1) P-3 was not able to deliver design GPM at the time of testing



RESEARCH AIR FLO, INC.

Apparatus Heating Coil Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 6/8/2016 Tested By: (b)(6)

Unit Data		Note	
Unit Number	HPWH-1		
Service	Load		
Air Data			
	Design	Actual	Note
CFM	-	-	
Entering DB (°F)	-	-	
Entering WB (°F)	-	-	
Leaving DB (°F)	-	-	
Leaving WB (°F)	-	-	
Water Data			
	Design	Actual	Note
GPM	5.0	5.0	
Entering Wtr. (°F)	115.0	120.0	
Leaving Wtr. (°F)	125.0	130.2	
Coil ΔP (ft.wc.)	-	13.0	
Flow Control Device Data		Note	
Manufacturer	-		
Type	-		
Size (in.)	-		
Position	-		
ΔP ()	-		

Unit Data		Note	
Unit Number	HPWH-1		
Service	Geothermal		
Air Data			
	Design	Actual	Note
CFM	-	-	
Entering DB (°F)	-	-	
Entering WB (°F)	-	-	
Leaving DB (°F)	-	-	
Leaving WB (°F)	-	-	
Water Data			
	Design	Actual	Note
GPM	4.0	4.0	
Entering Wtr. (°F)	70.0	70.1	
Leaving Wtr. (°F)	-	73.2	
Coil ΔP (ft.wc.)	3.0	3.5	
Flow Control Device Data		Note	
Manufacturer	TACO		
Type	ACCUFLO-VENTORI		
Size (in.)	1.00		
Position	45.0		
ΔP ()	9.6		

Remarks:



RESEARCH AIR FLO, INC.

Apparatus Heating Coil Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 12/01/16 - 2/28/17 Tested By: _____

Unit Data		Note	
Unit Number	HP-1	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1450	1515	
Entering DB (°F)			
Entering WB (°F)	-		
Leaving DB (°F)			
Leaving WB (°F)	-		
Water Data			
	Design	Actual	Note
GPM	12.0	12.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data			Note
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	7.0		

Unit Data		Note	
Unit Number	HP-2	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1020	1061	
Entering DB (°F)			
Entering WB (°F)	-		
Leaving DB (°F)			
Leaving WB (°F)	-		
Water Data			
	Design	Actual	Note
GPM	9.0	9.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data			Note
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	6.3		

Remarks:

- 1) Season of Maximum Load Heating



RESEARCH AIR FLO, INC.

Apparatus Heating Coil Test Report

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Test Date: 12/01/16 - 2/28/17 Tested By:

Unit Data		Note	
Unit Number	HP-3	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1700	1765	
Entering DB (°F)			
Entering WB (°F)			
Leaving DB (°F)			
Leaving WB (°F)			
Water Data			
	Design	Actual	Note
GPM	12.0	12.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data			Note
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	4.0		

Unit Data		Note	
Unit Number	HP-4	(1)	
Service			
Air Data			
	Design	Actual	Note
CFM	1200	1186	
Entering DB (°F)			
Entering WB (°F)			
Leaving DB (°F)			
Leaving WB (°F)			
Water Data			
	Design	Actual	Note
GPM	9.0	9.0	
Entering Wtr.(°F)			
Leaving Wtr.(°F)			
Coil ΔP (ft.wc.)			
Flow Control Device Data			Note
Manufacturer	Flow Design		
Type	Auto Flow		
Size (in.)	1.50		
Position	-		
ΔP ()	4.0		

Remarks:

- 1) Season of Maximum Load Heating



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

EF 1 & EF 2

WhisperGreenSelect[®]

VENTILATION FAN

Specification Submittal Data / Panasonic Ventilation Fan

Description

Customizable Ventilation Fan/Light shall be low-voltage ceiling mount rated for continuous run. Fan shall be ENERGY STAR[®] rated and certified by the Home Ventilating Institute (HVI). Fan shall include energy efficient LED lighting. Evaluated by Underwriters Laboratories and conform to both UL and cUL safety standards.

Motor/Motors:

- Enclosed DC brushless motor technology rated for continuous run.
- Fan ventilation rates shall be manually adjustable for 50-80-110 CFM.
- Power rating shall be 120 volts and 60 Hz.
- Fan shall be UL listed for tub/shower enclosure when used with a GFCI protected circuit and used in insulated ceiling (TYPE I.C.).
- Fan equipped with thermal cutoff fuse.
- Removable, permanently lubricated, plug-in motor.

Housing:

- Rust proof paint, galvanized steel body.
- Integrated dual 4" or 6" diameter duct adaptor.
- Built-in metal flange provides blocking for penetrations through drywall as an Air Barrier, and assists with the decrease in leakage in the Building Envelope during blower door testing.
- Built-in backdraft damper.
- Articulating and expandable installation bracket up to 24".

Grille:

- Attractive design using Poly Pro material.
- Attaches directly to housing with tension springs.
- Includes a motion sensor cap for use as a cover when the motion sensor Plug 'N Play[™] module has not been selected.

Light:

- Two replaceable, ENERGY STAR[®] rated, 7W GU24 base LED lamps.

Warranty:

- ALL Parts: 3 Years from original purchase date.
- DC Motor: 6 Years from original purchase date.
- LED: 5 years from original purchase date.

Architectural Specifications:

Customizable Ventilation Fan/Light shall be ceiling mount, ENERGY STAR[®] rated type with multi-speed control (0, 30-100 CFM, in 10 CFM increments) that shall be built-in with a high/low adjustable delay timer and activated by a wall switch, Motion Sensor Plug 'N Play[™] module or Condensation Sensor Plug 'N Play[™] module. Features a built-in speed selector. Select from 50/60/110 CFM and no more than <0.31/0.30/0.4 series as certified by the Home Ventilating Institute (HVI) at 0.1 w.g. with no less than 0.006/0.114 CFM and no more than <0.0/0.0/0.0 series at 0.25 w.g. Power Consumption shall be no greater than 4.0/5.0/11.1 watts at 0.1 w.g. and 7.5/11.4/18.0 watts at 0.25 w.g. ENERGY STAR[®] rated with efficiency of no less than 12.8/13.3/19.9 CFM/watt at 0.1 w.g. and 7.7/7.7/16.3 CFM/watt at 0.25 w.g. The motor shall be enclosed with brushless DC motor engineered to run continuously. DC motor speed shall automatically increase when the fan senses static pressure to maintain selected CFM. Power rating shall be 120v/60Hz. Duct diameter shall be no less than 4". Inclusive of an integrated dual 4" or 6" duct adaptor. Plug 'N Play[™] modules provide up to two additional features. Select from Condensation Sensor, LED Night Light and Motion Sensor. Fan shall be UL and cUL listed for tub/shower enclosure when used with a GFCI protected circuit. Fan can be used to comply with ASHRAE 62.2, LEED, ENERGY STAR[®], IAQ, EarthCraft, California Title-24 and WA Ventilation Code. Lamps shall be of the LED type with the fan utilizing no less than two 7 Watt, ENERGY STAR[®] rated, GU24 base LED lamps.



DC Motor Technology:

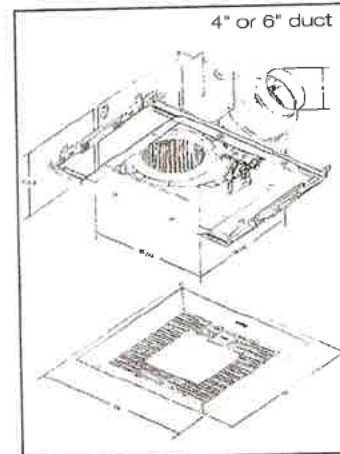
When fan senses static pressure, its speed is automatically increased to ensure that the desired CFM is not compromised, which allows the fan to perform as rated.

For complete Installation Instructions visit us.panasonic.com/ventfans

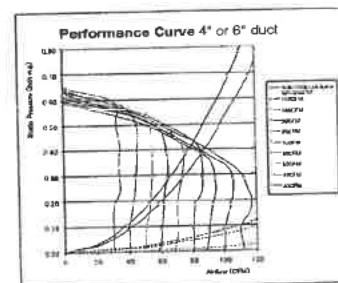
Model	Quantity	Comments	Project:
			Location:
			Architect:
			Engineer:
			Contractor:
			Submitted by:
			Date:



FV-05-11VKSL1



FV-05-11VKSL1



Location

Camp Lejeune, NC

System

Exhaust



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

EF 3

Vari-Green® Motor Options



Benefits

Operates on AC power that's converted to DC—providing a more efficient motor operation as compared to an AC operation.

- The motor can attain up to 85% efficiency and reduce energy consumption.
- Watt savings of 30-70% depending on rpm.
Note: As motor speed is turned down, efficiency stays high as compared to an AC motor that decreases dramatically.
- Operates cooler than a standard AC motor at lower RPMs. A cooler motor has longer motor life and reduces energy consumption.
- 80% usable RPM turndown as low as 300 rpm.
- SEI fans with Vari-Green motors can provide all the CFM and static pressure ranges of a comparable belt drive.

- Maintenance costs are reduced as there are no belts or bearings to replace and no pulleys to adjust.
- Direct drive fans are often preferred where maintenance access is difficult.
- Provides a solution for demand controlled ventilation applications.

Vari-Green Advantages

- Initial cost is less than a belt drive/motor starter combination.
- Lower operating cost
- No maintenance, no belts, pulleys or bearings
- Easy RPM adjustment

SE1 Performance Limits - Vari-Green®					CFM/Static Pressure in Inches WG														
Model Number	Fan RPM	Max BHP	Max Sones		0.00	0.05	0.10	0.125	0.15	0.20	0.25	0.30	0.375	0.50	0.625	0.75			
SE1-8-440	1725	0.044	11.3		511	470	435	387	349	261	220	191							
	300				89														
SE1-10-440	1725	0.098	11.3		1029	970	921	889	850	792	707								
	300				179														
SE1-12-426	1725	0.078	14.8		1239	1187	1122	1084	1043	947	828	711	468						
	300				215														
SE1-12-432	1725	0.26	14.8		1613	1553	1490	1455	1421	1334	1254	1176	1056	888	679	556			
	300				281														
SE1-12-436	1725	0.13	16.7		1621	1570	1513	1471	1429	1346	1230	1073	639						
	300				282														
SE1-14-432	1725	0.27	12.5		2370	2317	2264	2237	2209	2152	2096	2007	1864						
	300				412														
SE1-14-436	1725	0.38	16.3		2695	2635	2575	2544	2511	2445	2378	2292	2129	1728	1183				
	300				469														
SE1-14-440	1725	0.47	21		2385	2307	2234	2205	2176	2119	2048	1973	1877	1435	1282	1163			
	300				415														
SE1-16-421	1725	0.36	19		2516	2470	2424	2400	2377	2327	2268	2210	2093	1602					
	300				438														
SE1-16-426	1725	0.49	31		3136	3081	3026	2999	2972	2917	2852	2787	2681	2464					
	300				545														
SE1-16-428	1725	0.61	16.1		3325	3266	3207	3178	3149	3088	3026	2963	2849	2637	2365	1801			
	300				578														
SE1-16-436	1725	0.85	21		4019	3956	3894	3863	3832	3766	3697	3629	3526	3262	2790	2214			
	300				699														
SE1-18-424	1725	0.7	17		4164	4090	4017	3980	3943	3859	3768	3676	3519	3157	2825				
	300				724														
SE1-18-420	1725	0.85	22		4816	4737	4658	4618	4578	4489	4382	4274	4113	3817	3342	2860			
	300				838														
SE1-20-420	1550	0.61	24		4148	4073	4000	3963	3926	3859	3793	3726	3610	3352					
	1725				4616	4550	4483	4450	4417	4352	4292	4232	4143	3953	3718				
	1725	0.84	24		893														
	300																		

23

Location

Camp Lejeune, NC

System

Exhaust



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

Bel & Gossett
a xylem brand

SUBMITTAL

B-141.1

IOB: Base Entry Point

REPRESENTATIVE: James M. Pleasants Co.

UNIT TAG: P-1
ENGINEER:
CONTRACTOR:

ORDER NO.
SUBMITTED BY:
APPROVED BY:

DATE: 11/25/2013
DATE:
DATE:



1-1/4AA
Series "90"
Centrifugal Pumps
Vertical In-Line Mounted - Close Coupled

SPECIFICATIONS

FLOW 46 (GPM) HEAD 54 (FT)
HP 1.5 RPM 3450
VOLTS 115/208-230
CYCLE 60 PHASE 1
ENCLOSURE ODP Standard Efficient
APPROX. WEIGHT 62
SPECIALS

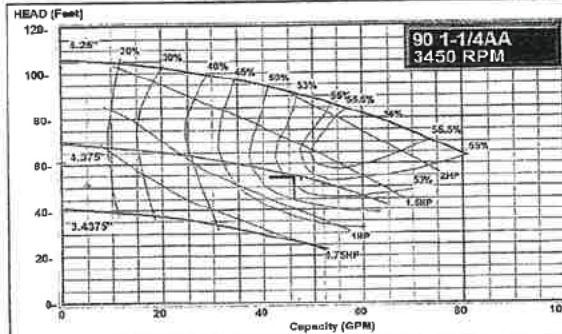
MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL BRONZE

MAXIMUM WORKING PRESSURE
☒ 175 psi (12 bar) W.P.

TYPE OF SEAL

☒ 90 Standard Seal
(Buna-Carbon/Ceramic)



Design Capacity = 46.0 GPM
Design Head = 54.0 Feet

Suction Size = 1.25"
Suct. Velocity = 9.9 fps
Discharge Size = 1.25"
Disc. Velocity = 9.9 fps

Min. Imp. Dia. = 3.4375"
Max. Imp. Dia. = 5.25"
Cut Dia. = 4.375"

Max. Flow = 64 GPM
B.E.P. Flow = 46 GPM

Eff. @ Duty Point = 52.55 %
Motor Size = 1.5 HP

B.H.P. @
Duty Point = 1.2 BHP
Max. B.H.P. for
Imp. Cut = 1.31 BHP

xylem
Let's Solve Water

Location

Camp Lejeune, NC

System

Pumps



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

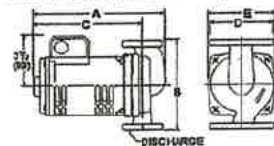
P-2

SERIES PL - Permanently Lubricated Booster Pumps

A-135G

MODEL NO.	FLANGE SIZE INCHES - NPT	MOTOR HP	DIMENSIONS - INCHES (mm)					APPROXIMATE SHIPPING WT. LBS. (KG)
			A	B	C	D	E	
PL-30	3/4, 1, 1-1/4 & 1-1/2	1/12	6 5/8 (216)	6 3/8 (192)	7 1/8 (181)	4 3/16 (106)	4 3/8 (111)	11.6 (5.3)
PL-36	3/4, 1, 1-1/4 & 1-1/2	1/6	6 3/8 (216)	6 3/8 (192)	7 1/8 (181)	4 3/16 (106)	4 3/8 (111)	13.1 (6.0)
PL-45	1, 1-1/4 & 1-1/2	1/8	6 1/8 (232)	6 1/2 (216)	7 1/4 (194)	4 5/8 (117)	4 1/2 (114)	14.5 (6.6)
PL-50	1, 1-1/4 & 1-1/2	1/8	6 1/8 (232)	6 1/2 (216)	7 1/4 (194)	4 5/8 (117)	4 1/2 (114)	14.5 (6.6)
PL-55	3/4, 1, 1-1/4 & 1-1/2	2/5	9 9/16 (243)	6 3/8 (192)	7 15/16 (202)	4 3/16 (106)	4 3/4 (121)	13.1 (6.0)
PL-75	2	1/8	9 15/16 (252)	6 1/2 (216)	7 3/8 (187)	5 3/16 (132)	4 5/8 (117)	18.6 (8.4)
PL-130/2"	2	2/5	19 3/4 (273)	6 1/2 (216)	8 1/4 (210)	6 3/16 (154)	5 5/8 (139)	22 (10)
PL-130/3"	3	2/5	19 3/4 (273)	6 1/2 (216)	8 1/4 (210)	6 3/16 (154)	5 5/8 (139)	27 (12.2)

Dimensions are approximate and subject to change. Contact factory for certified dimensions.

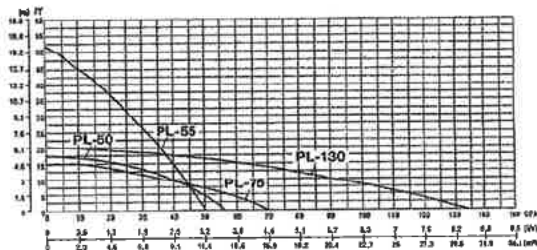
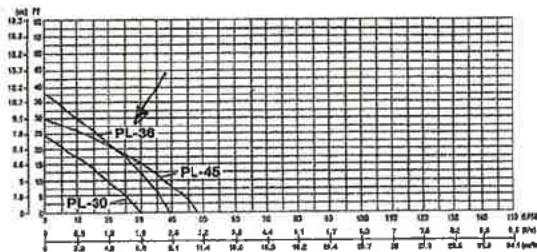


TYPICAL SPECIFICATIONS

The contractor shall furnish and install inline pumps as illustrated on the plans and in accordance with the following specifications:

1. The pumps shall be of the horizontal, permanently lubricated type, specifically designed and guaranteed for quiet operation.
2. The pumps shall have a steel shaft supported by permanently lubricated, sealed precision ball bearings. The pumps are to be equipped with a water-tight seal to prevent leakage. Mechanical seal faces to be carbon on silicon carbide. The motor shall be non-overloading at any point on the pump performance curve.
3. The motor shall be of the drip-proof, sealed precision ball-bearing, quiet-operating construction. The permanent split-capacitor motor shall be equipped with thermal overload protection.
4. Pumps to be suitable for 225°F (107°C) operating temperature at 150 psig (10 bar) working pressure. The pumps shall be Bell & Gossett, A Xylem brand. Model No. PL-_____ with a capacity of _____ GPM at _____ feet of head.

PERFORMANCE CHARACTERISTICS CURVES



Xylem Inc.
6200 N. Austin Avenue
Morton Grove, IL 60053
Phone: (847)946-3700
Fax: (847)946-3779
www.bellgossett.com

Bell & Gossett is a trademark of Xylem Inc. or one of its subsidiaries.
© 2014 Xylem Inc.

xylem
Let's Solve Water

Location

Camp Lejeune, NC

System

Pumps

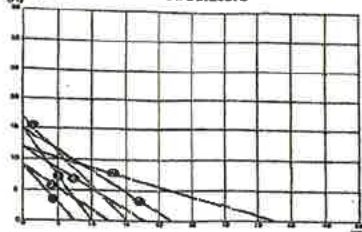


RESEARCH AIR FLO, INC.

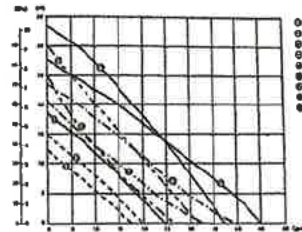
Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion TB#: 24887

System Lubricated Circulators



- 1 NBF-40LW
- 2 NBF-40LW
- 3 NBF-40LW
- 4 NBF-40LW
- 5 NBF-40LW
- 6 NBF-40LW
- 7 NBF-40LW
- 8 NBF-40LW
- 9 NBF-40LW
- 10 NBF-40LW
- 11 NBF-40LW
- 12 NBF-40LW
- 13 NBF-40LW
- 14 NBF-40LW
- 15 NBF-40LW
- 16 NBF-40LW
- 17 NBF-40LW
- 18 NBF-40LW
- 19 NBF-40LW
- 20 NBF-40LW
- 21 NBF-40LW
- 22 NBF-40LW
- 23 NBF-40LW
- 24 NBF-40LW
- 25 NBF-40LW
- 26 NBF-40LW
- 27 NBF-40LW
- 28 NBF-40LW
- 29 NBF-40LW
- 30 NBF-40LW
- 31 NBF-40LW
- 32 NBF-40LW
- 33 NBF-40LW
- 34 NBF-40LW
- 35 NBF-40LW
- 36 NBF-40LW
- 37 NBF-40LW
- 38 NBF-40LW
- 39 NBF-40LW
- 40 NBF-40LW
- 41 NBF-40LW
- 42 NBF-40LW
- 43 NBF-40LW
- 44 NBF-40LW
- 45 NBF-40LW
- 46 NBF-40LW
- 47 NBF-40LW
- 48 NBF-40LW
- 49 NBF-40LW
- 50 NBF-40LW
- 51 NBF-40LW
- 52 NBF-40LW
- 53 NBF-40LW
- 54 NBF-40LW
- 55 NBF-40LW
- 56 NBF-40LW
- 57 NBF-40LW
- 58 NBF-40LW
- 59 NBF-40LW
- 60 NBF-40LW
- 61 NBF-40LW
- 62 NBF-40LW
- 63 NBF-40LW
- 64 NBF-40LW
- 65 NBF-40LW
- 66 NBF-40LW
- 67 NBF-40LW
- 68 NBF-40LW
- 69 NBF-40LW
- 70 NBF-40LW
- 71 NBF-40LW
- 72 NBF-40LW
- 73 NBF-40LW
- 74 NBF-40LW
- 75 NBF-40LW
- 76 NBF-40LW
- 77 NBF-40LW
- 78 NBF-40LW
- 79 NBF-40LW
- 80 NBF-40LW
- 81 NBF-40LW
- 82 NBF-40LW
- 83 NBF-40LW
- 84 NBF-40LW
- 85 NBF-40LW
- 86 NBF-40LW
- 87 NBF-40LW
- 88 NBF-40LW
- 89 NBF-40LW
- 90 NBF-40LW
- 91 NBF-40LW
- 92 NBF-40LW
- 93 NBF-40LW
- 94 NBF-40LW
- 95 NBF-40LW
- 96 NBF-40LW
- 97 NBF-40LW
- 98 NBF-40LW
- 99 NBF-40LW
- 100 NBF-40LW

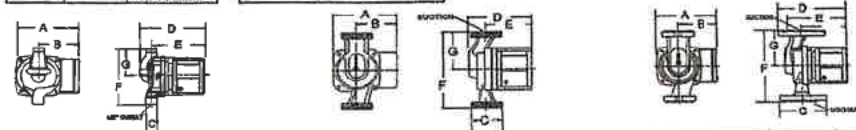


A-127L

HALF UNION CONNECTIONS

For NBF-40LW, NBF-120LW, NBF-22U, SSF-40LW, SSF-120LW, SSF-22U

MODEL NUMBER	PART NUMBER	DESCRIPTION (SETS OF 2)
UC-1/2B	113203LF	1/2" Bronze Union Swivel
UC-3/4B	113201LF	3/4" Bronze Union Swivel
UC-3/4NPT	113202LF	3/4" Bronze Union NPT Female



MODEL	PART NUMBER	A In (mm)	B In (mm)	C In (mm)	D In (mm)	E In (mm)	F In (mm)	G In (mm)
NBF-40LW	10325LWF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
NBF-40LW	10325LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
SSF-40LW	10320LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
NBF-120LW	10320LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
SSF-120LW	10320LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
NBF-22U	10325LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
SSF-22U	10325LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
NBF-22	10325LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
SSF-22	10325LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	4-9/32 (100)	5 (127)	3-1/2 (89)
NBF-25	10341LF	5-1/8 (127)	3-3/16 (81)	3-3/16 (81)	6-3/16 (161)	5-1/8 (127)	5-1/8 (127)	3-1/2 (89)
NBF-35	10335LF	5-1/8 (127)	3-3/16 (81)	3-3/16 (81)	6-3/16 (161)	5-1/8 (127)	5-1/8 (127)	3-1/2 (89)
NBF-38	10340LF	5-3/4 (146)	3-3/16 (81)	3-3/16 (81)	6-3/16 (161)	5-3/8 (137)	5-3/8 (137)	3-1/2 (89)
NBF-45	10340LF	5-3/4 (146)	3-3/16 (81)	3-3/16 (81)	6-3/16 (161)	5-3/8 (137)	5-3/8 (137)	3-1/2 (89)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

Companion Flanges Available in Sizes: 3/4", 1", 1-1/4", and 1-1/2"

* 3-speed circulators

Xylem Inc.
8200 N. Austin Avenue
Morton Grove, IL 60053
Phone: (847) 965-3700
Fax: (847) 965-6379
www.bellgosssett.com

Bell & Gosssett is a trademark of Xylem Inc. or one of its subsidiaries.
© 2014 Xylem Inc.

xylem
Let's Solve Wat

Location

Camp Lejeune, NC

System

Pumps



RESEARCH AIR FLO, INC.

Curves & Charts

Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion

TB#: 24887

3 SPECIFY THE COIL RUNOUT PIPE SIZES.

Refer to the ASHRAE recommendations shown in the chart below. Some designers prefer to use 80 percent of the ASHRAE maximum.

ASHRAE Recommended Maximum GPM

Nominal Size	Type L Copper	Sch. 40 Pipe	ASHRAE Criteria
1/2"	2.8	3.8	Maximum Velocity four feet/sec.
3/4"	5.9	6.5	
1"	10	11	
1 1/4"	16	18	
1 1/2"	23	25	
2"	39	41	Maximum Loss four feet/100 feet
2 1/2"	76	72	
3"	138	160	
4"	270	275	
6"	775	775	

4 SELECT THE AUTOFLOW VALVE SPRING RANGE.

Two spring ranges are available for all AutoFlow valves: 2 to 32 psi and 5 to 60 psi. The first number is the differential pressure (ΔP) needed to achieve design flow. The second is the maximum ΔP where the design flow will be maintained. Following are some general rules on the selection of the spring range. In most cases the amount added to the calculated pump head is 4.6 feet (2 psi X 2.3 feet/psi).

- For direct return systems, if the total pump head is less than 110 feet, the 2-32 range can generally be used for all units.
- On reverse return systems the 2-32 range can be used for all units.
- For direct return systems with a total pump head exceeding 110 feet, the 5-60 range should be used only on units close to the pump to maintain control.

To calculate the spring range required for a specific terminal unit:

Estimate the losses due to -

- pump accessories such as suction diffusers, check valves, etc.
- distribution pipe loss to the terminal unit
- terminal coil, ATC, and Y-strainer drops at design flow.

Add a, b, and c and then subtract from the total pump head.

If less than 74 feet, use the 2-32 range. If greater than 74 and less than 138 feet, use the 5-60 range.

Example:

The total pump head is 132 feet and the total of a, b and c is 35 feet. $132 - 35 = 97$ Use the 5-60 range since the remaining pump head is greater than 74 feet (32 psi).

5 SELECT THE AUTOFLOW CARTRIDGE FLOW RATE.

Using the chart below, find the available flow according to the size valve required and the system design flow. If the required flow falls between two available flows, round to the nearest flow listed.

Size	PSID	Available Flow Rate (GPM) by Cartridge
1/2-3/4"	2-32	0.33, 0.5, 0.67, 0.75, 0.88, 1.0, 1.1, 1.25, 1.5, 1.75, 2.0, 2.25, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 6.0, 7.0, 8.0
	5-60	1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12
1-1 1/4"	2-32	0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0, 2.25, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
	5-60	1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27
1 1/2-2"	2-32	5.0, 6.0, 7.0, 8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50
	5-60	8.0, 9.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70
2 1/2"	2-32	8.0, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 56, 60, 64, 68, 72, 76, 80
	5-60	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108, 112, 116, 120

Flows for sizes 3"-30" are available in increments of 5 GPM for PSID 2-32 and 5-60, and 10 GPM for PSID 3-20, 5-40 and 7-45.

Size	PSID	Max GPM	Size	PSID	Max GPM	Size	PSID	Max GPM
3"	2-32	135	8"	2-32	945	14"	2-32	2565
	5-60	170		5-60	1190		5-60	3230
	3-20	290		3-20	1400		3-20	3800
	5-40	250		5-40	1750		5-40	4750
4"	7-45	300	10"	7-45	2100	20"	7-45	5700
	2-32	270		2-32	1485		2-32	4320
	5-60	340		5-60	1970		5-60	5440
	3-20	400		3-20	2200		3-20	6400
6"	5-40	500	12"	5-40	2750	30"	5-40	8090
	7-45	600		7-45	3300		7-45	9600
	2-32	540		2-32	2925		2-32	9450
	5-60	680		5-60	2550		5-60	11900
6"	3-20	800	12"	3-20	3000	30"	3-20	14000
	5-40	1000		5-40	3750		5-40	17500
	7-45	1200		7-45	4500		7-45	21000

NOTE: 5", 16", 18" and 24" flows available, see specific submittal

15

Location

Camp Lejeune, NC

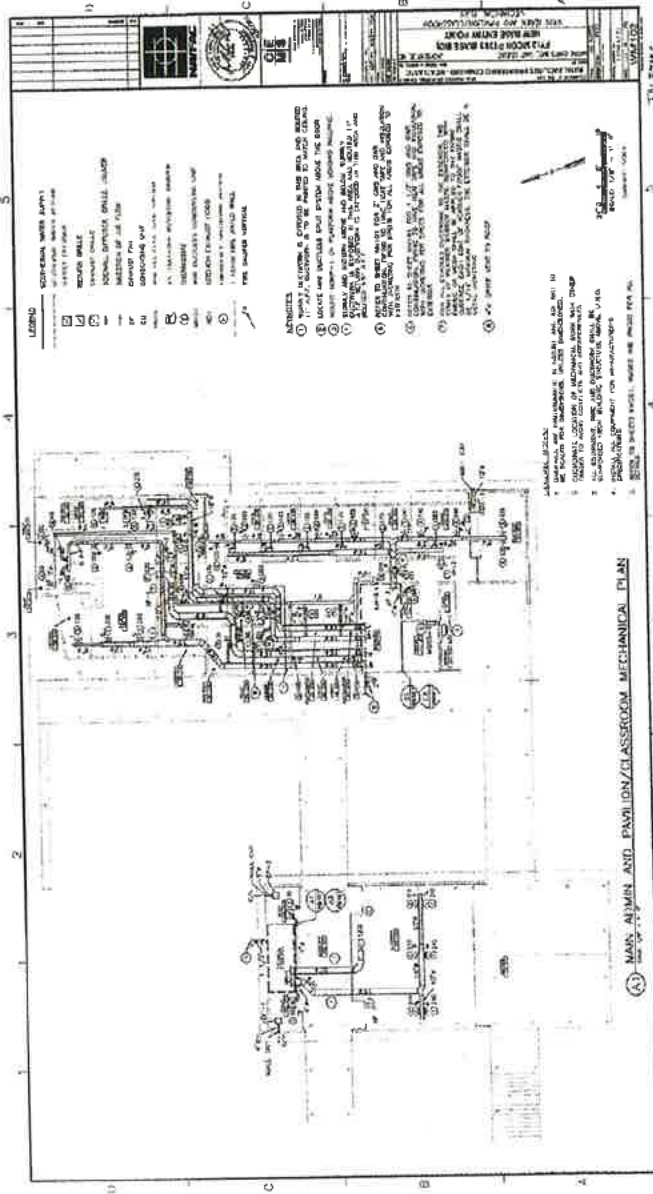
System

Valves



Project: P1383 & P1384 - New Base Entry - Main Admin and Pavilion
 TB#: 24867

Project Address	Drawing Number	WM102
Camp Lejeune, NC	Floor Plan	Mechanical
	Drawing By	RCH
	System	Supply & Return



P-1383/P-1384 NEW BASE ENTRY POINT & ROAD
CONTRACT N40085-12-C-7714
MCB CAMP LEJEUNE, NORTH CAROLINA
SUBMITTAL TRANSMITTAL # 1238
NAVFAC ACCEPTANCE – CODE CI52 (PAG)

Title **Test and Balance (TAB) Report Submittal Number Two Review**

Disposition – **Disapproved/Resubmit (D/R)**

1. Disapproved / Resubmit (D/R) disposition indicates responses to unclosed issues and a corrected resubmission are necessary at this time.

Action Item Abbreviations

1. Action item abbreviations presented below identify party responsible for resolving issue.

AG = NAVFAC Acceptance Group	ES = Equipment Supplier
CC = Controls Contractor	FA = Fire Alarm Contractor
CM = NAVFAC Construction Manager	GC = General Contractor
CxA = Commissioning Authority	MC = Mechanical Contractor
DOR = Designer of Record	PM = NAVFAC Project Manager
EC = Electrical Contractor	TAB = Test and Balance Contractor
For Informational Purposes Only = No responsible party, no action required	

Introduction

1. These issues are based on comparing TAB Report submittal number two dated 09 Jun 2016 with transmittal dated 11 Jun 2016 and received by the acceptance group on 11 Jun 2016 to contract document's and TAB agency certifying organization's requirements. TAB Report submittal number one dated 02 May 2016 was marked preliminary and not formally reviewed.
2. Issues are organized into the following sections:

<ul style="list-style-type: none">• General• ERV-01• Heat Pumps• Split Systems• Exhaust Fans	<ul style="list-style-type: none">• Duct Traverses• Unit Heaters• Pumps• HP Water Heater• TAB Report Deficiencies
--	---
3. Approval or acceptance does not relieve contractor of responsibility for any error in accordance with specification 01 33 00 page 15, section 1.13.
4. It is the contractor quality control manager's responsibility to ensure responses are obtained from all applicable responsible parties as indicated and are substantive.
5. Unless indicated as an issue for action, issues are for informational purposes only.
6. The following references serve as the basis of these comments due to the contract award date of 03 Apr 2012:
 - Unified facilities criteria [UFC 3-400-10N - Mechanical Engineering](#) dated Mar 2012
 - Unified facilities criteria [UFC 4-010-01 - DoD Minimum Antiterrorism Standards for Buildings](#) dated Feb 2012
 - American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Fundamentals dated 2009
 - ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality dated 2010

- ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings dated 2010
7. NEBB's Procedural Standards for Testing Adjusting and Balancing of Environmental Systems dated 2005 serves as the basis of TAB certifying organization's requirements. It should be noted that Procedural Standards page 6, section 2.3.1 states "Regardless of what is specified, in all cases the process by which the data is acquired shall conform to the current edition of the NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
 8. These issues are grouped into **system deficiencies** that are seldom TAB report deficiencies and **TAB report deficiencies** that are deviations of the TAB report from contract requirements.
 9. These issues are based on the premise that all recommendations and suggested practices contained in the TAB agencies certifying organization shall be considered mandatory in accordance with specification 23 05 93 page 3, section 1.3.

General Issues

1. Submittal is being reviewed noting systems must be balanced within ± 5 -percent of design values per specification 23 05 93 page 5, section 3.3.1.
2. Submittal includes airflows that are beyond the allowable tolerance of ± 5 -percent of design value as allowed by specification 23 05 93 page 5, section 3.3.1. With some exceptions noted herein, because of system type, operation mode at which tolerance is exceeded, and / or value beyond the allowed tolerance is insignificant, no issues are warranted.

ERV-01 Issues

3. Submittal pages 6 and 7 of 24 include ERV-1 Supply Fan and Exhaust Fan Motor Actual electrical supply voltage of 122 VAC which conflicts with Design supply voltage of 230 VAC. It is unclear whether the installed ("Actual" data) motor varies from the submitted ("Design" data) motor or there is another issue. Descriptive information addressing the discrepancy in voltage is necessary to close this issue. – **Action Item for MC / TAB**
07062016 XXX Response:
 - ☐ This is not an issue requiring resolution based on basis description.
 - ☒ This is an issue of concern and has been / shall be resolved by resolution description-- Corrected in final report- WM601 calls for 120v unit..
4. Submittal pages 6 and 7 of 24 include ERV-1 Supply and Exhaust Heat Wheel Design Apparent Capacities of 27,637 BTU/Hr and 45,382 BTU/Hr which conflicts with CI52-calculated Heat Wheel Design Apparent Capacities. Descriptive information addressing the discrepancies is necessary to close this issue. – **Action Item for TAB**
07062016 XXX Response:
 - ☐ This is not an issue requiring resolution based on basis description.
 - ☒ This is an issue of concern and has been / shall be resolved by resolution description
Temperatures were re-taken and recorded in the final report. Unit is basis of Design. These units are not operating under an occupied environment design temps max not be achieved at this time..

5. Submittal page 7 of 24 includes ERV-1 Exhaust Heat Wheel Actual Entering Air Temperature (EAT) wet bulb of 43.7°F (with dry bulb of 67.5°F) yielding 4% relative humidity (RH) which conflicts with an anticipated higher wet bulb. Since the Design EAT RH (50% RH) was incorrectly entered as the wet bulb temperature, it is unclear if the reported value is %RH or EAT_{wb}. Descriptive information addressing the unit of measure of the 43.7 value is necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description corrections made, temps were re-measured and recorded in final report. These units are not operating under an occupied environment design temps mas not be achieved at this time..

Heat Pumps Issues

6. No comments warranted.

Split Systems Issues

7. No comments warranted.

Exhaust Fans Issues

8. No comments warranted.

Duct Traverses Issues

9. No comments warranted.

Unit Heaters Issues

10. No comments warranted.

Pumps Issues

11. Submittal page 23 of 24 includes HPWH-1 Pump P-2 Actual water flow of 9.0 GPM which exceeds Design water flow of 5.0 GPM by 4.0 GPM or 80-percent, beyond allowable tolerance of 5-percent. Actual Final Head Pressure of 30.5 FT exceeds Design Final Head Pressure of 4.0 FT. Given the configuration of the system and the status of the construction, the pump isolation valve downstream of the pump may be utilized as the balance valve and marked appropriately. Descriptive information addressing the water balance results is necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description P-2 was throttled to design GPM. P-3 is a "Plumbing Pump" and flow will be verified in a separate enclosure. and not part of the HVAC TAB. Pressure readings are recorded in final report..

HP Water Heater Issues

12. Submittal page 24 of 24 includes HPWH-1 Load-side water Actual EAT of 12.1°F which conflicts with the anticipated EAT being above 32°F. Descriptive information addressing the discrepancy is necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- Typo corrected in the final report.

TAB Report Deficiencies Issues

13. Submittal excludes certification page and a table of contents which conflicts with specification 23 05 93 page 12, Appendix B. These items are necessary to close this issue.

– Action Item for TAB

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- included in final report.

14. Submittal excludes TAB supervisor's approval and signature which conflicts with specification 23 05 93 page 13, Appendix B, section 6, b. TAB supervisor's approval and signature are necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- included in final report.

15. Submittal excludes heating systems operational performance documentation during maximum outdoor environmental caused loading which conflicts with specification 23 05 93 page 7, section 3.3.5.2. An estimated date for obtaining this documentation is necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- 11-15-2016-----2-28-2017 heating season.

16. Submittal excludes calculated capacity documentation within coil performance report sheets which conflicts with specification 23 05 93 page 6, section 3.3.3.1. This documentation is necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- included in final report.

17. Submittal excludes updated air system diagrams complete with final installed locations of all terminals and devices, numbering changes, and actual test locations which conflicts with specification 23 05 93 page 14, Appendix B, section 6, d. Diagrams are necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- included in final report.

18. Submittal excludes pump performance curves which conflicts with specification 23 05 93 page 14, Appendix B, section 6, h. Curves are necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- included in final report.

19. Submittal excludes fan performance curves which conflicts with specification 23 05 93 page 14, Appendix B, section 6, h. Curves are necessary to close this issue.

– Action Item for TAB

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-- included in final report.

20. Submittal excludes factory calibration curves for balancing valves which conflicts with specification 23 05 93 page 15, Appendix B, section 6, i. Curves are necessary to close this issue. – **Action Item for TAB**

07062016 XXX Response:

- ☐ This is not an issue requiring resolution based on basis description.
☒ This is an issue of concern and has been / shall be resolved by resolution description-included in final report.